(2014 batch onwards)

G 501.6a

Reg. No.

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
PHYSICS – Paper VII
Nuclear Physics and Analog Electronics

Time: 3 hrs.

Max Marks: 100

SECTION – A

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

1. a) What is meant by activity of a radioactive substance? Mention its S.I. unit.

   b) Mention any two factors on which the number of alpha particles scattered at a particular angle depend.

   c) What are magic numbers?

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

   e) What is the significance of a Q-value of a nuclear reaction?

   f) Why does the fusion reaction require a high plasma density and high temperature?

   g) What are the drawbacks of LINAC?

   h) What is the principle of a semiconductor detector?

   i) What is meant by frequency response of a transistor amplifier?

   j) Mention any two applications of an OP-AMP.

   k) Draw the circuit diagram of non-inverting adder.

   l) Explain the Barkhausen critetrion.

SECTION – B

Answer TWO full questions from each unit:

UNIT – I

2. a) With elements A,B and C forming a radioactive series (C being stable), derive an expression for the number of atoms of B, if at the start B was not present in the sample. **(6)**

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

3. a) Derive the Alpha particle scattering formula, assuming the expression for the impact parameter. **(6)**

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

4. a) Explain the variation of cosmic ray intensity with, **(6)**

   i) Latitude   ii) East-West direction

   b) Explain the four basic interactions in nature. **(4)**

UNIT – II

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

   b) Derive the expression for Q-value of a nuclear reaction in terms of the masses of the particles involved. **(4)**

1

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

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

7. a) Describe the working of Betatron. Derive an expression for the final **(6)** energy of electrons in a Betatron.

   b) Describe the construction and working of a GM detector.   **(4)**

UNIT – III

8. a) Draw the diagram of a CE amplifier using voltage divider bias. Explain **(6)** the method of obtaining its DC and AC load line.

   b) Explain the low frequency response of a CE amplifier.   **(4)**

9. a) Define h-parameter for two port network and arrive at the h-parameter **(6)** equivalent for a transistor in CE mode.

   b) Explain the need of a buffer amplifier. How is it realized using an **(4)**

   OP-AMP.

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

   b) Draw the circuit of RC phase shift oscillator using transistor and explain **(4)** its working.

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 the earth. Half life of U^{238} and U^{235} are 4.5×10^9 years and 7.13×10^8 years respectively.

12. In Dempster's mass spectrograph an accelerating p.d of 1000 volt is required to bring Mg^{25} ions on the slit. What is the potential difference required bring Mg^{24} ions on to the slit, the magnetic field being kept constant.

13. Find the threshold energy of the nuclear reaction $_7N^{14}(n,\alpha)\,_5B^{11}$.

    Given mass of $_7N^{14} = 14.003074\ amu$

    mass of $_5B^{11} = 11.009305\ amu$

    mass of $_0n^1 = 1.0086695\ amu$

    mass of α-particle $= 4.002603\ amu$.

14. In a cyclotron, Dees with diameter 2m accelerate Alpha particles to the energy of 100 MeV. Calculate the magnetic field strength and frequency of the oscillator used.

15. A small signal silicon n-p-n transistor amplifier has the following parameters. hie=3.5K, h_{fe}=250, R_E=2K R_L=5.6K, R_1=30K, R_2=18K, R_c=1K, V_{CE}=5V, V_{cc}=12V and I_c=2mA. Find the input and output resistance, voltage and power gain.

16. For the inverting amplifier, if the input voltages are 3V, 5V and 7V and corresponding resistance are 3K, 5K and 7K respectively and feedback resistor is 5K. Calculate the output voltage.

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G 501.6b

St Aloysius College (Autonomous) Mangaluru

B.Sc. Semester VI – Degree Examination
April - 2017
PHYSICS – Paper VIII
COMMUNICATION AND DIGITAL ELECTRONICS, SPECIAL PROPERTIES OF MATERIALS

Time: 3 hrs.   Max Marks: 100

SECTION – A

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

1. a) What is modulation? State any one reason for the need of modulation.

   b) What is meant by interlaced scanning?

   c) Draw the circuit diagram of diode detector.

   d) Which are the three primary colours used in TV?

   e) What is a logic gate? Name the logic gate which produces '1' output only when all its inputs are at '0' states.

   f) Give the digital circuit for AND gate using NAND gate.

   g) What is an edge triggered flip-flop?

   h) What is a register?

   i) What is critical temperature in case of superconductors?

   j) What are quantum dots?

   k) What are linear dielectrics?

   l) What is the use of non linear optical media?
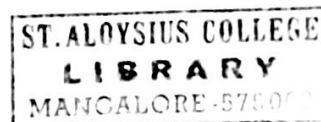
SECTION – B

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

UNIT – I

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

   b) Draw a block diagram of CRT and mention the functions of various systems.   (4)

3. a) Describe FM radio receiver with a block diagram.   (6)

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

4. a) Explain the theory of frequency modulation using wave diagram.   (6)

   b) Explain the theory of colour mixing in TV.   (4)

UNIT – II

5. a) What is an AND gate? Explain its construction using diodes and show that its truth table can be realised using various conditions for input.   (6)

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

G 501.6b

6. a) Explain the working of binary counter using JK flip flop. **(6)**

   b) Explain how an XOR gate can be constructed using NAND gates? **(4)**

7. a) Discuss the SR flip-flop, with its truth table and write its symbol. **(6)**

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

UNIT – III

8. a) Discuss the generation of second harmonic frequency in non-linear **(6)** media.

   b) Explain polarisation in non-linear dieletric. **(4)**

9. a) Explain the characteristic properties of super conductor. **(6)**

   b) Briefly explain the structure, classification and properties of carbon **(4)** nano-tubes.

10.a) Describe the major uses and applications of superconductors. **(6)**

   b) Explain the effect of external magnetic field on super conductors. **(4)**

SECTION – C

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

11. An AM broadcast transmitter radiates radio waves at 20KW at modulation index 75%. Calculate the power of the radio wave.

12. An Am wave is represented by the expression

    $V = 5(1 + 0.6 \cos 6280t) \sin 2.11 \times 10^6 t$

    i) What are the minimum and maximum amplitudes of AM wave?

    ii) What frequency components are contained in the modulated wave and what is the amplitude of each component?

13. Draw a logic circuit which represents the expression $Y = \overline{(A+B)} \cdot C$

14. Simplify $Y = \bar{A} B \bar{C} + AB\bar{C} + ABC$.

15. Using Boolean identifies show that

    i) (A+B) (A+C) = A+BC

    ii) $CA + C\bar{A} B = CA + CB$

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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G 502.6a

Reg. No.

St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination
### April - 2017
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

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

(2x10=20)

a) Hydrogen chloride molecule is IR active. Give reason.

b) What is Raman shift?

c) Write the number of phases present in the following systems.

i) Miscible gases　　　ii) Water and ice

d) State Frank Condon principle.

e) What is trans effect?

f) Write any two applications of organomercury compounds.

g) Give one method of preparation of tetra carbonyl nickel.

h) Write any two properties of organo aluminium compounds.

i) What are conformational isomers?

j) What is a meso compound' Give an example.

k) Explain the acidity of alpha hydrogens in ethyl aceto acetate.

l) What are optical isomers? Give an example.
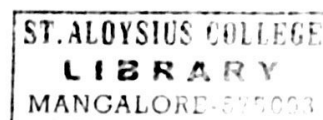
PART – B

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

(3x10=30)

i) Calculate the zero point energy of hydrogen in J/mol. The fundamental vibrational frequency of hydrogen is 4400×10^2 m^{-1} and $h=6.62 \times 10^{-34}$ J.S

ii) Draw vibrational energy level diagram of a simple harmonic oscillator and explain it.

iii) Write any three advantages of Raman spectroscopy.

iv) Define phase. Give one example.

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v)   Explain the stepwise formation of a complex.

vi)   Explain the S_N2 mechanism for substitution in square planar complexes of Pt (II).

vii)   Write any three applications of organo aluminium compounds.

viii)   Explain the nature of bonding in metal carbonyls.

ix)   What are threo and erythro compounds? Give one example.

x)   Explain geometric isomerism in alicyclic compounds.

xi)   Explain keto-enol tautomerism of ethyl aceto acetate.

xii)   Give the synthesis of α, β unsaturated acids from aceto acetic ester.

PART – C

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

3.   The fundamental vibration frequency of HCl is 8.67×10^{13} Hz. Calculate the force constant of HCl bond. Mass of H=1.6739×10^{-27} kg and Mass of Cl=5.895×10^{-26} kg.

4.   Discuss the applications of IR and Raman spectroscopy.

5.   Discuss the phase diagram of water system.

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

7.   Explain any one method of determination of stability constant.

8.   Derive the relationship between stepwise stability constant and overall stability constant for a complex.

9.   Describe the method of preparation, structure and bonding in organo lithium compounds.

10.   Write any one method of preparation mononuclear metal carbonyls. Explain the structure of Nickel tetra carbonyl.

11.   Discuss conformational analysis of ethane molecule.

12.   What is resolution of racemic mixture? Describe any two methods of resolution of a racemic mixture.

13.   Explain the mechanism of Claisen condensation reaction.

14.   Give the synthesis of dicarboxylic acid and alkyl acetic acid from malonic ester.

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(2014 batch onwards)

G 502.6b   Reg. No: ☐☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
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

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

(2×10=20)

1. a) Write the Debye -Huckel Onsager equation and explain the terms.

   b) Give any two advantages of potentiometric titrations.

   c) What is a reference electrode? Give an example.

   d) What is Liquid -Junction potential?

   e) Write the composition of pyrex glass.

   f) Define octane number.

   g) What are green reactions? give an example.

   h) What are propellants? Give an example.

   i) What is chemical shift in NMR spectra?

   j) Mention any two advantages of TMS as a standard in NMR spectroscopy.

   k) State isoprene rule.

   l) How are dyes classified based on structure?

PART – B

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

(3×10=30)

2. i) Explain relaxation effect.

   ii) Explain the principle of conductometric titrations.

   iii) How do you determine Ka by conductometric measurement?

   iv) What are concentration cells? Give the different types of concentration cells.

   v) Explain Biochemical oxygen demand (BOD)

   vi) How do radioactive wastes pollute the environment?

   vii) Give the preparation of RDX.

   viii) Explain the need for green Chemistry.

   ix) What is coupling constant?

   x) How does inductive effect affect the chemical shift on NMR?

   xi) Give the synthesis of Fluoroscein.

   xii) Explain the synthesis of Malachite green.

PART – C

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

3. How are mixtures of acids titrated against a strange base conductometrically?

4. Explain the construction and working Calomel electrode.

5. How do you determine the solubility product of a sparingly soluble salt by using concentration cells.

6. Explain the determination of transport number by moving boundary method.

7. Explain the different types of water pollutants and explain how the polluted water can be treated?

8. Explain the manufacture of biogas.

9. What are explosives and give the preparation TNT?

10. Explain in detail the various applications of green chemistry.

11. Explain shielding and deshielding effects in NMR spectroscopy.

12. Discuss the PMR spectra of ethyl bromide.

13. Explain the molecular orbital theory of colour and constitution.

14. What are terpenoids? Explain the structure of menthol.

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(2014 batch onwards)

G 503.6a

Reg. No.

St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination

April - 2017

MATHEMATICS – Paper VII

PARTIAL DIFFERENTIAL EQUATIONS, FOURIER SERIES AND LINEAR ALGEBRA

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

Note: Answer all parts

PART – A

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

1. Check for the integrability condition:

   $(yz + xyz)dx + (zx + xyz)dy + (xy + xyz)dz = 0.$

2. Solve: $(2x + y^2 + 2xz)dx + 2xy\, dy + x^2 dz = 0.$

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

4. State the Dirichlet conditions for the existence of Fourier series.

5. Write the Fourier series of even function $f(x)$ and write the formula for a_0, a_n.

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

7. If $T: V \to W$ is a homomorphism of vector spaces, then prove that kernel of T is a subspace of V.

8. If S is a subset of a vector space V, then prove that $L(S)$ is a subspace of V.

9. If $\{v_1, v_2, \dots, v_n\}$ is an orthonormal set, then prove that $v_1, v_2, \dots, v_n$ are linearly independent.

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

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

12. Prove that image of a linear transformation is a subspace of the co-domain.

13. Prove that $T_r(AB) = T_r(BA)$.

14. Define raw rank of a $m \times n$ matrix.

15. If $A \in M_n(F)$ has $q(x)$ as the minimum polynomial and $f(A) = 0$ then prove that $q(x)|f(x)$.

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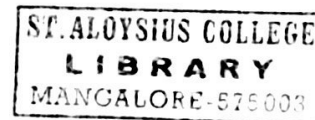
PART – B
UNIT - I

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

1. Solve $(y^2 + yz)dx + (xz + z^2)dy + (y^2 - xy)dz = 0$ by treating one variable as constant.

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

3. Solve $(y + z)dx + (z - x)dy - (x + y)dz = 0$ by the method of Auxillary equation.

4. Solve: $(yz + z^2)dx - xzdy + xydz = 0$.

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

UNIT - II

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

1. Obtain the Fourier series of $f(x) = x^2, -\pi < x < \pi$ and $f(x + 2\pi) = f(x)$ and deduce that $1 - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \cdots = \frac{\pi^2}{12}$.

2. Obtain the half range cosine and sine series for $f(x) = \pi - x$ in $[0, \pi]$.

3. Find a Fourier series of

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

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

UNIT - III

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

1. Prove that the vectors $v_1, v_2, \ldots, v_n$ in a vector space V are either linearly independent or some v_k is a linear combination of the preceding ones.

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 $m \leq n$.

3. a) If a, b, c are real numbers such that $a > 0$ and $a\lambda^2 + 2b\lambda + c \geq 0 \; \forall \lambda$ then prove that $b^2 \leq ac$.

   b) If $v_1, v_2, \ldots, v_n$ in a vector space V are linearly independent then prove that every element in thier linear span has a unique representation of the form $\lambda_1 v_1 + \lambda_2 v_2 + \cdots + \lambda_n v_n$ where $\lambda_i \in F$.

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

5. Let V be a finite dimensional and W be a subspace of V, then prove that $\dim W \leq \dim V$ and $\dim \frac{V}{W} = \dim V - \dim W$.

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UNIT – IV

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

1. Let $\beta_1, \beta_2, \dots, \beta_n$ be a basis for a vector space V and $\alpha_1, \alpha_2, \dots, \alpha_n$ are any vector in W, then prove that there exists a unique linear transformation $T: V \to W$ such that $T(\beta_i) = \alpha_i$.

2. Prove that a linear transformation T of a vector space V with finite basis $\alpha_1, \dots, \alpha_n$ is non singular if and only if $T(\alpha_1), \dots, T(\alpha_n)$ are linearly independent in V.

3. If $T: V \to W$ is a one one linear transformation of V onto W then prove that its inverse is linear.

4. Let V and V' be vector spaces of dimension m and n respectely. Then prove that dimension of $L(V, V')$ is mn.

5. Let $v_1, \dots, v_n$ be a basis of V and $T \in L(V, V)$. Further, let $A = m(T)$ with respect to $v_1, v_2, \dots, v_n$. If $B = CAC^{-1}$, where C is non signular matrix then prove that there exists a basis $w_1, \dots, w_n$ such that $m(T)$ with respect to $w_1, \dots, w_m$ is B.

UNIT - V

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

1. Prove that every square matrix satisfies its characteristic polynomial.

2. Prove that similar matrices have the same minimum polynomial.

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

4. Find the solutions of the system

$$x_1 + x_2 + 2x_3 + x_4 = 5$$

$$x_1 + x_2 + 2x_3 + 6x_4 = 10$$

$$x_1 + 2x_2 + 5x_3 + 2x_4 = 7 \text{ by the method of row reduction.}$$

5. Find the rank of the matrix using the method of row reduction: $\begin{bmatrix} 6 & -2 & -18 \\ -4 & 1 & 11 \\ -5 & 2 & 16 \end{bmatrix}$

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G 503.6b(ii)

Reg. No. :

St. Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
MATHEMATICS – Paper VIII
NUMERICAL METHODS

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

PART – A

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

1. Calculate the value of $\sqrt{102} - \sqrt{101}$ correct to four significant figures.

2. Evaluate the sum $= \sqrt{3} + \sqrt{5} + \sqrt{7}$ to 4 significant digits and find it's relative error.

3. Define a) Truncation error   b) Rounding error.

4. Write a formula for $\dfrac{d^2y}{dx^2}$ for Newton's backward differences.

5. Define forward differences.

6. With usual notations prove that $E = 1 + \Delta$.

7. Prove that $[x_0, x_1, x_2] = \dfrac{\Delta^2 y_0}{2n^2}$.

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

9. Define the divided differences $[x_0, x_1, x_2]$.

10. Define norm of a vector.

11. Find the rank of the matix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 8 \\ 3 & 2 & 1 \end{bmatrix}$.

12. If $A = \begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$, find $\|A\|_\infty$.

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

14. Write the Adam's-Moulton corrector formula.

15. Explain Taylor's Method in solving a first order differential equation $y = f(x,y), \, y(x_0) = y_0$.

PART – B

UNIT - I

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

1. Solve the equation $x^3 - 2x - 5 = 0$ correct to 3 decimal places.

2. Using the method of Iteration, find the root of the equation $2x = \cos x + 3$, correct to 3 decimal places.

3. Describe the method of False-position.

4. Find a real root of the equation $x \sin x + \cos x = 0$ by the method of Newton-Raphson, given that root lies between $\pi/2$ and π.

5. Derive Aitken's Δ^2 process of accelerating the convergence of the Iteration method to find the root of $f(x) = 0$.

UNIT – II

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

1. Describe Newton's backward difference formula interpolation.

2. Find the Lagrange's Interpolating polynomial of degree 2 approximating the function $y = \ln x$ defined by the following table of values and hence find the value of $\ln 2.7$.

x	2	2.5	3
$y = \ln x$	0.69313	0.91629	1.09861

3. For a cubic polynomial which takes the following values $y(0) = 1$, $y(1) = 0$, $y(2) = 1$, $y(3) = 10$ and hence find $y(4)$ using Newton's forward difference formula.

4. From the following table, find the number 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

5. The table below gives the values of $\tan x$ for $0.10 \le x \le 0.30$ find $\tan(0.12)$.

x	0.10	0.15	0.20	0.25	0.30
$y = \tan x$	0.1003	0.1511	0.2027	0.2553	0.3093

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UNIT - III

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

1. From the following table find 'x' correct to 2 decimals for which 'y' is maximum.

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

2. Derive Simpson's $\frac{1}{3}$ rule using the method of undetermined coefficients.

3. Compute the value of $\int_0^1 \frac{dx}{1+x^2}$ using trapezoidal rule with $h = 0.5$.

4. Calculate the first and second derivatives of the function tabulated below at the point $x = 2.2$ and also find $\frac{dy}{dx}$ at 2.0.

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 questions.   (3×5=15)

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

2. Describe Gauss-Jordan method in solving a system of linear equation.

3. Slove the following equation by Gauss-Elimination method.

   $2x + 2y + 4z = 18$
   $x + 3y + 2z = 13$
   $3x + y + 3z = 14$

4. Solve the system of equations by Jacobi's Method.

   $10x_1 - 2x_2 - x_3 - x_4 = 3$
   $-2x_1 + 10x_2 - x_3 - x_4 = 15$
   $-x_1 - x_2 + 10x_3 - 2x_4 = 27$
   $-x_1 - x_2 - 2x_3 + 10x_4 = 9$

5. Solve the system of equations by Gauss-Seidal Method.

   $83x + 11y - 4z = 95$
   $7x + 52y + 13z = 104$
   $3x + 8y + 29z = 71$

14

UNIT – V

Answer any <u>THREE</u> questions. $(3 \times 5 = 15)$

1. Solve $\dfrac{dy}{dx} = \dfrac{x^2}{y^2 + 1}$ with $y = 0$, when $x = 0$ by Picard's method of successive approximation. Find 'y' for $x = 0.25$, $x = 0.5$ and $x = 1$ correct to 3 decimal places.

2. By using modified Euler's method, determine the value of 'y' when $x = 0.1$ Given that $y(0) = 1$ and $y^1 = x^2 + y$.

3. Derive Runge-Kutta 2nd order formula.

4. Solve $y^1 - 1 = y^2$, $y(0) = 0$, $h = 0.1$ using Euler's method, calculate $y(0.4)$.

5. Find $y(0.8)$ using Adam-Bashforth formula for $y^1 = 1 + y^2$, with $h = 0.2$, given that $y(0) = 0$, $y(0.2) = 0.2027$, $y(0.4) = 0.4288$, $y(0.6) = 0.6841$.

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G 503.6b(v)   Reg. No: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
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. Prove that rain drops are too small to pull the earth?

3. If the time required to assemble the first plane is 1,00,000 man hours and progress rate is 90%, find the time required to produce the 100th plane.

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

5. Find the mean waiting time for the women with $p = 0.1$. Also find the fraction of women whose waiting time is less than or equal to mean waiting time.

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

7. Determine the optimal order size, if 40 items are sold per day carrying cost 0.1, ordering cost =100.

8. Define system error and random error.

9. Suppose a set of measurement of the weight x of a speck of dust is fit by uniform probability density function

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

If two measurements are taken, what is the probability that first falls between 5 & 8 the record falls between 8 and 10.

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

11. Give the algorithm for pivot transform.

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. State travelling salesman problem.

14. Find the first three terms of solution of the difference equation

$$x(t+1) - x(t) = \frac{1}{x(t)}, x(0) = 1.$$

15. State Knapsack problem.

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. Construct Galileo's gravitational model, Evaluate it and modify it.

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

5. State the assumption of velocity square model for raindrops with $D \geq 0.004$ feet. Derive an equation for terminal velocity. Find the terminal velocity of the raindrop having diameter D=0.004 feet. Also find out the time required for it to fall 3000 feet.

UNIT - II

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

1. Construct the Leslie model for population growth.

2. State the four categories of errors in modeling. Explain them using a "controlled source seismology".

3. Explain the inventory policy model.

4. Suppose 20 balls are sold per day having carrying cost $0.05/ball/day and ordering cost $ 100/order. Find the optimal order size and yearly cost.

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

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 $(x_1, y_1), (x_2, y_2), \ldots \ldots, (x_n, y_n)$. find an expression for m.

2. 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

3. Find R^2 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

4. Construct the college Enrollment model.

5. Find the best fittings straight line for efficiency of a car using the table.

s.mph	30	40	50	60	70
e. mp.g	18.25	20.00	16.32	15.71	13.61

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. Using simplex algorithem, solve Maximize

   $p = 5x_1 + 6x_2$ subject to $x_1, x_2 \geq 0$
   $2x_1 + 4x_2 \leq 24$ and $6x_1 + 3x_2 \leq 30$

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. Explain the algorithm for stepping stone method.

2. Find the first five terms of the solution to the difference equation

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

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

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

4. Suppose 36% of the yeast cells splits in 40 minutes where unit time is 2 hours, prove that the yeast cell population $x(t)$ is given by $x(t + 1) \approx 2.5\, x(t)$.

5. Find the improvement index for each unused square where circuler indicates B.F.S

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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 - 2017

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. Show that $E(aX + b) = aE(X) + b$.

2. A random variable assumes values 1 and -1 with probabilities p and $1 - p = q$. Find the mean and variance.

3. Show that cumulative distribution function is an non-decreasing function.

4. If $E(X^2) = 289$, $V(X) = 64$ find $E(X)$.

5. For a Poisson distribution $E(X^2) = 6$. Find the p.m.f.

6. Define geometric distribution. State the situation in which it can be applied.

7. If X has the uniform distribution over the range $(0, 1)$ find the mean and variance.

8. Find the distribution function of a random variable with p.d.f. $f(x) = \theta e^{-\theta x}$, $x \geq 0$.

9. Write down the probability density function of beta distribution of second kind. What are its mean and variance?

10. In a normal distribution the first 25% of the observations are 20 or less and the last 25% of the observations are 50 or more. Then what is the quartile deviation of the series?

11. Name the discrete distribution for which

    a) Mean = Variance   b) Mean > Variance   c) Mean < Variance.

12. If X_1 and X_2 are two independent Poisson variates, is $X_1 - X_2$ is a Poisson variate? Give resons.

13. Give the p.d.f. of bivariate normal distribution stating its parameters.

14. What do you mean by convergence in probability? Briefly explain to application.

15. State Markov's inequality and explain its application.

PART – B
UNIT - I

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

1. State and prove multiplication theorem of expectation for any two independent random variables.

2. Verify whether the following is a *p.d.f.*

$$f(x)=\begin{cases} x & 0 \le x < 1 \\ 2-x & 1 \le x < 2 \\ 0 & otherwise \end{cases}$$

Deduce its mean and variance.

3. Find the value of k such that following is a probability mass function. Also find $V(X)$ and $V(-2X+1)$

X :	-1	0	1	2
$p(x)$:	k^2	$k^2 - \dfrac{1}{6}$	$\dfrac{k}{3}$	k

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

x \ y	1	3	9
2	0.1	0.1	0.05
4	0.2	0.1	0.05
6	0.1	0.15	0.2

UNIT - II

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

1. Obtain an expression for mode of Poisson distribution.

2. a) The probability that an individual suffers a bad reaction from infection of a given serum is 0.001. Determine the probability that out of 2000 individuals exactly three will suffer a bad reaction.

   b) In a police control room there are on an average 3 calls per 10 minutes interval. Find the probability that there are

   i) 4 calls   ii) atleast 2 calls in 10 minutes interval (3+4½)

3. Show that negative binomial distribution tends to Poisson distribution under certain conditions.

4. Derive the mean and variance of geometric distribution.

UNIT - III

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

1. State and prove memoryless property of exponential distribution with parameter θ.

2. Obtain the median for a normal variable with parameters μ and σ^2.

3. Derive the mean and variance of beta distribution of first kind.

4. The distribution of wages of a group of workers in known to be normal with men ₹500 and S.D ₹ 100. If the wages of 100 workers in a group are less than ₹ 430. What is the total number of workers in a group?

20

UNIT - IV

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

1. Suppose (X,Y) has a bivariate normal distribution then X and Y are independent if and only if X and Y are uncorrelated. Justify.

2. Two dimensional continuous R.V. (X,Y) has a bivariate normal distribution obtain the marginal distribution of Y.

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

4. Deduce the M.G.F. of bivariate normal variate and hence obtain its mean and variance.

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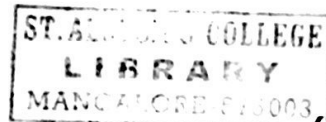
Answer any TWO of the following.   **(2×7½=15)**

1. a) If $x_i (i = 1,2,....,n)$ can assume only two values i^α and $-i^\alpha$ with equal probabilities. Show that WLLN holds for the sequence $x_1, x_2...$ if $\alpha < \dfrac{1}{2}$.

   b) A distribution with unknown mean μ has variance 1.5. Use CLT to find how large a sample should be taken from the distribution in order that the probability will be atleast 0.95 that the sample mean will be within 0.5 of the population mean.   **(4+3½)**

2. Define convergence in distribution of a sequence of random variables with atleast 2 applications and state any three basic results on convergence in probability.

3. State and prove De-Moivre's Laplace central limit theorem.

4. a) Examine whether WLLN holds good for the sequence $\{X_n\}$ of independent random variables where $P\left[X_n = \dfrac{1}{\sqrt{n}}\right] = \dfrac{2}{3}$ and $P\left[X_n = -\dfrac{1}{\sqrt{n}}\right] = \dfrac{1}{3}$.

   b) 6 fair dice are rolled independently 1000 times. Let X be the number of 6's on 1000 trials. Using CLT compute:

   i) $P(X > 200)$ ii) $P(X < 175)$.   **(4½+3)**

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G 504.6a

St Aloysius College (Autonomous)
Mangaluru
B. Sc. Semester VI – Degree Examination
April - 2017

ELECTRONICS – PAPER VII
Fiber optics and Digital Communication Systems

Time: 3 Hours

Max. Marks: 100

Note: This question paper has 2 sections. Section – A and Section – B. Section – A is compulsory. Answer any EIGHT full questions from Section – B selecting TWO full questions from each unit.

SECTION – A

1. Choose the correct answer from the choices given at the end of each question and write the correct answer.

(10x1=10)

(i) Solar cell works on the principle of ----------
   a) photo emission
   b) photo conduction
   c) photo transition
   d) photo electric effect

(ii) LASER is the abbreviation for ----------
   a) Light amplification by stimulated emission of radiation.
   b) Light application by stimulated emission of radiation.
   c) Light amplification by source emission of radiation.
   d) Light amplification by spontaneous emission of radiation.

(iii) Light is guided through core of an optical fiber based on the principle of --------------
   a) Diffraction
   b) Total internal reflection
   c) Total internal refraction
   d) dispersion

(iv) Quantum efficiency of a detector is the ratio of ---------
   a) Output voltage to input voltage
   b) Output optical power to input electrical current
   c) Output optical power to input electrical power
   d) Output electrical power to input optical power

(v) --------- is an optical detector.
   a) Laser diode   b) photo diode   c) LED   d) Zener diode

(vi) Which one of the following communication system requires a synchronization pulse?
   a) PWM   b) PPM   c) PCM   d) PAM

(vii) PAM stands for --------
   a) Pulse analog modulation
   b) Pulse angle modulation
   c) Pulse amplitude modulation
   d) Pulse adjust modulation.

(viii) ISP stands for ---------
   a) Internet service provider
   b) Internet service protocol
   c) Internet scheme provider
   d) Internet service provider

(ix) If 'f_m' is the highest frequency of a message signal then sampling frequency 'f_s' is selected such that ----------.
   a) $f_m \geq 2f_s$ b) $f_s \geq 2f_m$ c) $f_m \geq f_s$ d) $f_s \geq f_m$

x) The four fields of IP address have numbers between -------
   ----
   a) 0 and 100   b) 0 and 255   c) 0 and 999   d) 0 and 99

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

   (i) Differentiate between spontaneous and stimulated emissions.

   (ii) An optical fiber has core and cladding refractive indices of 1.5 and 1.4 respectively. Calculate the acceptance angle.

   (iii) Mention any two disadvantages of PWM over PPM.

   (iv) Write a note on cell splitting.

   (v) Define the terms:
       a) Responsivity
       b) Quantum efficiency with reference to photo detectors

   (vi) Expand the terms:
       a) SIM   b) CDMA

   (vii) If 30% of electron-hole pairs recombine non radioactively calculate the quantum efficiency of the optical source.

SECTION – B

UNIT – I   (10x8=80)

3. a) With necessary diagrams explain different types of optical fibers.   (6)

   b) What is LASCR? Explain a solid state relay.   (4)

4. a) With necessary diagram explain the principle of transmission of light through fiber. Hence device the expression for numerical aperture.   (6)

   b) Write a note on photo conductive cell.   (4)

5. a) Explain different types of losses in optical fibers.   (6)

   b) Write a note on photo transistor. Explain how it can be used in opto coupler.   (4)

UNIT – II

6. a) With necessary diagram explain construction and working of a surface emitting LED.   (6)

   b) With necessary diagram explain the working of optical modulation circuit.   (4)

7. a) What is a photo diode? With necessary diagram explain a PN photo diode.   (6)

   b) The quantum efficiency of InGaAs photo detector is 90% at 1300 nm. Calculate the responsivity value.   (4)

8. a) With necessary diagram explain the construction and working of a edge emitting LED.   (6)

   b) When 3×10^{11} photons each with a wave length of 0.85 μm are incident on a photo diode, 1.2×10^{11} electrons are collected at the terminals of the device. Determine the quantum efficiency and the reponsivity of the photo diode.   (4)

UNIT - III

9. a) With block diagram explain the generation and detection of PCM signals. (6)

   b) With diagram explain the detection of PPM signals. (4)

10. a) With circuit diagram explain the generation of PWM signals. (6)

    b) Write a note on frequency division multiplexing. (4)

11. a) What is meant by TDM? With necessary diagrams explain TDM techniques in digital communication. (6)

    b) With necessary diagrams explain the detection of PAM signal. (4)

UNIT – IV

12. a) Explain any three internet services. (6)

    b) Write a note on internet protocols. (4)

13. a) With block diagram explain GSM architecture. (6)

    b) With block diagram explain the transmission and reception of signals in DSSS technology. (4)

14. a) Explain the terms:
    a) Frequency reuse
    b) Call hand off with reference mobile communication system (6)

    b) Write a note on pseudo random noise code in CDMA Communication. (4)

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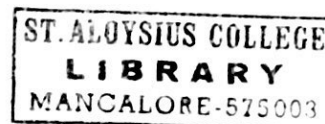
G 504.6b   (2012-2014 Batch)

Reg. No: ☐☐☐☐☐☐

St. Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
ELECTRONICS – Paper VIII
8086 Microprocessor and C Language

Time: 3 Hours

Max. Marks: 100

Note: This question paper has 2 sections. Section – A and Section – B. Section – A is compulsory. Answer any EIGHT full questions from Section – B selecting TWO full questions from each unit.

SECTION – A

1. Choose the correct answer from the choices given at the end of each question and write the correct answer.

(10x1=10)

(i) Minimum mode system means ------------
   a) system with single processor
   b) dual processor system
   c) system with no processor
   d) multi processor system

(ii) The flag which is used to manipulate strings in 8086 microprocessor is ------
   a) TF   b) DF   c) CF   d) IF

(iii) ---------- is not a string constant in C language.
   a) "Electron"   b) "Proton"   c) 'hello'   d) "1234"

(iv) ---------- is used as bitwise operator in C
   a) ~   b) - -   c) ?:   d) ++

(v) The 8086 microprocessor has ------- bit IP register
   a) 8 bit   b) 20 bit   c) 16 bit   d) 24 bit

(vi) Maskable interrupts can be controlled using ---------flag
   a) DF   b) CF   c) TF   d) IF

(vii) ----------- is a invalid C statement
   a) while (x = 5)   b) for (i=0; i<n;i++)   c) a = c+d;   d) switch (ch)

(viii) ---------- is not a storage class in C.
   a) extern   b) static   c) auto   d) intern

(ix) In 8086 microprocessor accumulator register is ---------- bit
   a) 8   b) 32   c) 16   d) 4

(x) If a = 25 what will be the value of the variable a and b after executing the instruction b = a++;
   a) 26,26   b) 26,25   c) 25,26   d) 25,25

2. **Answer any _FIVE_ of the following:**   (5x2=

   (i) Differentiate between procedure and macro.

   (ii) Calculate physical address of the code: given [DS] = 2000h, [CS] = 1200h, [IP]= 2000h and [BX] = 68FEh.

   (iii) Explain goto statement in C.

   (iv) Explain the role of SI and DI during string manipulation.

   (v) Write a program to accept elements to a one dimensional array in C language

   (vi) Explain if-else statement.

   (vii) Write an alternative instruction for each the following.

      a) LEA DI, offset array   b) MOV AX, 0000h

SECTION – B

UNIT – I   (10x8=80

3. a) Explain general purpose and segment registers of 8086 microprocessor.

    b) Write an 8086 microprocessor program to find factorial of a number.

                                                                  (6+4)

4. a) Explain the following 8086 instructions with an example to each

        i) CMP   ii) DIV

    b) With syntax and example explain PROC and ENDP directives of 8086 microprocessor.   (6+4)

5. a) With example explain any three addressing modes of 8086 microprocessor.

    b) List all possible 8086 instruction to clear the content of accumulator.

                                                                  (6+4)

UNIT – II

6. a) What is stack? Explain how stack is used while calling the procedure.

    b) Write a note on programmed I/O.   (6+4)

7. a) What are interrupts? Explain the steps involved in execution of interrupts in 8086 microprocessor.

    b) With example explain XLAT instruction.   (6+4)

8. a) Write the syntax of the following instructions of 8086 microprocessor with example.

        i) SCASB   ii) STOSB

    b) Write an 8086 microprocessor assembly language program to copy source string to destination string.   (6+4)

UNIT - III

9. a) Explain the bitwise operators used in C language. Give example to each.

    b) Explain the following C functions with example
        i) gets()   ii) printf()   (6+4)

10. a) With syntax and example explain if-elseif statement in C language.

   b) Write a C program to find the largest of 3 numbers.   **(6+4)**

11. a) Explain the logical operators used in C language. Give example to each operators.

   b) Write a C program to find the area of a triangle   .   **(6+4)**

UNIT – IV

12. a) What is a user defined function? With example explain how user defined functions are written in C language.

   b) Write a C program to find the average of N numbers.   **(6+4)**

13. a) What is a string? How string is defined? What are the different methods of initializing strings in C language?

   b) With example explain continue and break statement in C language.   **(6+4)**

14. a) What is an array? Explain the different methods of defining and initializing a single dimensional array.

   b) Write a note on any two storage classes.   **(6+4)**

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Reg. No. ☐☐☐☐☐

St Aloysius College (Autonomous) Mangaluru

B.Sc Semester VI – Degree Examination
April - 2017
Computer Science – Paper VII
### MICROPROCESSOR ARCHITECTURE AND PROGRAMMING

Time: 3 hrs.

Max Marks: 100

PART–A

Answer any TEN of the following: (10x1=10)

1. a) Name the functional units of 8086.

   b) What is an assembler?

   c) What is the difference between instruction and directive.

   d) Why do you call CX register as count register?

   e) What is the difference between maskable and non-maskable interrupts

   f) Differentiate between ADD and ADC.

   g) What is zero operand instruction?

   h) What is the use of direction flag?

   i) Name any two control flags.

   j) Expand STI and CLI.

   k) Which is the addressing mode of the instruction CMC?

   l) Write the structure of BYTEREGS defined in DOS.H.
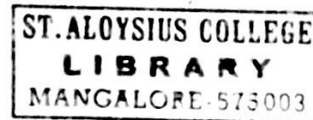
Answer any FIVE questions from the following. (5x2=10)

2. a) Differentiate between a macro and a procedure.

   b) Given DS=8B674, SI=389H and BX=7865H. Calculate the physical address in the data segment using indirect addressing mode.

   c) What is the use of interrupt flag in handling the interrupt?

   d) What will be the condition of AF, CF, 2F and PF after the execution of ADD AX,BX instruction? Given AX=34H and BX=1004H.

   e) How Loop instructions works in 8086?

   f) What are interrupt vectors? How many types are available?

PART–B

Answer Four full questions choosing one from each unit

Unit I

3. a) With neat block diagram, explain the architecture of 8086 in detail. (10)

   b) Explain the functions of different index registers of 8086. (6)

   c) Explain the following assembler directives with syntax and example. (4)
   i) SEGMENT   ii) PROC

4. a) What is addressing mode? Explain the direct, indirect and immediate addressing modes with example. (7)

   b) List and explain the types of 8086 instructions based on the number of operands. (6)

   c) With the help of timing diagram, explain the various bus activities during memory read cycle. (7)

Contd...2

Unit II

5. a) Explain the XLAT, XCHG, ROR and IN instruction of 8086.   (8)

   b) Write a program to reverse a string and check whether it is a   (6)
       palindrome or not.

   c) Explain the DAA and DAS instructions with suitable examples.   (6)

6. a) Explain any three program control instructions with an example. (6)

   b) Explain the following instruction of 8086 with syntax and example (8)

       i) CMPSB   ii) REPE   iii) LODSB   iv) STOSB

   c) Explain the CBW and CWD instructions with examples.   (6)

Unit III

7. a) What is a procedure? How do you pass parameters to a procedure   (7)
       through stack? Explain with an example.

   b) Write a macro to print a two digit number on the screen.   (6)

   c) Write a procedure to find the factorial of an integer. Use this   (7)
       procedure to find the value of nc_r.

8. a) Explain the ASCII to integer conversion algorithm with an example. (6)

   b) What is a stack? Explain the stack related instructions of 8086. (8)

   c) List the steps involved in invoking DOS call. Explain with an example. (6)

Unit IV

9. a) Explain the action taken by 8086 when it detects an interrupt signal. (7)

   b) What is an interrupt? Explain the internal and external interrupts. (8)

   c) Write a note on DOS interrupt.   (5)

10. a) Explain the intdos and intdosx functions used in C with syntax and (5)
        example.

    b) Explain the different categories of interrupt services.   (6)

    c) Write a note on in-line assembly language programming.   (4)

    d) What is hardware interrupt? How is it recognized by 8086?   (5)

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(2007-2014 batch)

G 505.6b

Reg. No. ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc Semester VI – Degree Examination
April - 2017
Computer Science – Paper VIII
JAVA PROGRAMMING

Time: 3 hrs.   Max Marks: 100

PART–A
Answer any <u>TEN</u> of the following: (10x2=20)

1. a) Why Java is known as platform neutral language?

   b) List any two differences between Java and C.

   c) Write equivalent Java expressions for the following
      i) $Z = ½\sqrt{10x^3 - 20x^2}$ ii) $X = \left(\frac{m1.m2}{n1+n2}\right)g$

   d) Differentiate static member from normal member of a class.

   e) What is type casting? Why it is required?

   f) Differentiate abstract class and final class in Java.

   g) What is wrapper class? Give an example.

   h) What is an exception? List any two system exceptions in Java.

   i) What is the difference between sleep and wait methods of thread?

   j) What do you mean by exception?

   k) How to extend an interface in Java? Give an example.

   l) What do you mean by thread? How to start thread in Java?

PART–B
Answer any <u>One</u> full question from each unit.   (4x20=80)

Unit I

2. a) Describe the structure of typical Java program with an example.   (6)

   b) Explain any four tools of JDK.   (4)

   c) Explain the following   (6)
      i) java virtual machine   ii) scope of variable

   d) What do you mean by precedence and associatively of operators? Give   (4)
      precedence of arithmetic and logical operators.

3. a) Explain the following features of Java.   (5)
      i) Compiled & Interpreted   ii) Robust & Secure   iii) Dynamic

   b) Explain any four mathematical functions in Java.   (4)

   c) What is command line arguments? Write a program to display N strings (6)
      passed through command line.

   d) Write a note on conditional and special operators in Java.   (5)

Unit II

4. a) Explain switch statement with syntax and example.   (5)

   b) Explain visibility control in Java.   (5)

G 505.6b

    c) What is a constructor? Explain constructor overloading with an example. (5)

    d) How to create and access an object of a class. Explain with the help of an example. (5)

5. a) Explain jumps in loops and labelled loops with example. (5)

    b) What is inheritance? Explain how single inheritance is implemented in Java with an example. (5)

    c) What is method overriding? Explain with the help of an example. (5)

    d) Write a java program to reverse a given number and check whether it is palindrome or not. (5)

Unit III

6. a) With syntax and example explain how to define, implement and extend an interface. (6)

    b) With an example explain the steps involved in creating package. (6)

    c) What is vector? Explain any three vector methods. (4)

    d) Explain any two methods of StringBuffer class with the help of an example. (4)

7. a) Explain how multiple inheritance is implemented in java with example. (6)

    b) List and explain any five string methods in Java (6)

    c) How to add a new class to an existing package? Explain. (4)

    d) Write a note on wrapper class. (4)

Unit IV

8. a) How to handle multiple exceptions in a Java program? Explain with an example. (5)

    b) How to handle user defined exceptions? Explain. (4)

    c) Explain complete life cycle of a thread. (6)

    d) Write a note on thread priority. (5)

9. a) What is finally block? When and how it is used? Explain with an example. (6)

    b) Write a Java program to catch ArithmeticException. (5)

    c) How to create thread? Explain with an example. (6)

    d) Write a note on thread exceptions (3)

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G 506.6a

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017

STATISTICS – Paper VII
Sampling Theory

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

PART – A

Answer any TWELVE of the following.   (2x12=24)

1. What do you mean by census survey?
2. Define simple random sampling.
3. What do you mean by judgement sampling?
4. Show that under SRSWR variance of sample mean is σ^2/n.
5. Mention any two disadvantages of simple random sampling.
6. Explain the basis of stratification in stratified random sampling.
7. Define the term standard error.
8. Mention the factors that should be kept in mind while deciding the sample size in stratified random sampling.
9. Show that mean of the stratified sample is an unbiased estimator of population mean.
10. What is meant by Neyman's allocation?
11. State any two advantages of systematic sampling.
12. Write down all possible systematic samples of size 4 from a population consisting of 20 units $y_1 \, y_2 \dots y_{20}$.
13. What do you mean by cluster sampling?
14. Define the terms sampling unit and sampling frame.
15. With usual notations show that $E(p) = P$

PART – B

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

16. Explain the principles of sample survey.
17. What are sampling and non sampling errors? Explain.
18. Show that in SRSWR, sample mean is unbiased for population mean. Also obtain the expression for its standard error.
19. Show that under SRSWOR, sampling variance of sample mean is given by
$$V(\bar{y})_{WOR} = \frac{N-n}{N_n} S^2$$
20. Show that under SRSWR, $E(s^2) = \sigma^2$
21. Prove that in SRSWOR $E(s^2) = S^2$

22. Derive the expression for the variance of the estimated mean under stratified random sampling. Modify the formula under proportional allocation.

23. With usual notations show that for stratified random sampling

$$V(\bar{y})_{st} = \frac{1}{N^2} \ \Sigma_{h=1}^{K} \ N_h(N_h - n_h)\frac{S_h^2}{n_h}$$

24. Show that the systematic sample mean is unbiased for the population mean. Also obtain the formula for variance of systematic sample mean.

PART – C

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

25. a) Briefly explain the advantages of sampling enumeration over census enumeration.

    b) Under SRS WR show that $V(\bar{y}) = \frac{\sigma^2}{n}$

                                                                          (5+5)

26. Explain the principal steps involved in sample survey.

                                                                          (10)

27. With usual notations prove that

$$V(\bar{y})_{SRSWOR} \geq V(\bar{y})_{prop.} \geq V(\bar{y})_{opt.}$$

                                                                          (10)

28. a) With usual notations prove that

$$V(\bar{y}_{st})opt = \frac{\left(\Sigma_{h=1}^{k} W_h S_h\right)^2}{n} - \frac{\Sigma_{h=1}^{k} W_h S_h^2}{N}.$$

    b) Prove that in a stratified Random Sampling the variance of the estimated mean is minimum for a fixed sample size, if sample is allocated with $n_h \propto N_h S_h$

                                                                          (4+6)

29. a) Show that

$$V(\bar{y}_{sys}) = \frac{N-1}{N} s^2 - \frac{k(n-1)}{N} S_{wsy}^2.$$ Also compare simple random sampling without replacement and systematic sampling.

    b) Show that an unbiased estimate of

$$V(p) = \frac{N-n}{Nn} \frac{pq}{N}.$$

                                                                          (6+4)

30. For a population with linear trend prove that

$$V(\bar{y}_{st}) \leq V(\bar{y}_{sys}) \leq V(\bar{y})_{SRSWOR}$$

                                                                          (10)

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(2007 Batch onwards)

G 506.6b

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017

STATISTICS – Paper VIII
Operations Research

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

PART – A

1. **Answer any TWELVE of the following.** (2x12=24)

a) Give any two applications of OR.

b) Point out the criteria for the existence of
   i) Multiple solution and ii) Degenerate solution in LPP

c) What are slack and surplus variables?

d) What is meant by dual of an LPP?

e) With reference to a Transportation Problem define
   i) Feasible Solution and ii) Optimum Solution

f) How do you solve a maximization assignment problem?

g) Write down the mathematical model of assignment problem.

h) Mention any two advantages of duality in LPP.

i) Give any two properties of dual problem.

j) Differentiate between deterministic and stochastic inventory models.

k) State any two characteristics of a game.

l) With reference to project network define
   i) Free float and ii) Total float

m) What do you mean by inventory control?

n) Mention any two difference between PERT & CPM.

o) Define 'Pure strategy and 'Mixed strategy' in the theory of games.

PART – B

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

2. Define operations research. Explain any two models in operations research with an example each.

3. Find the basic solutions for the system of equations

   $3x_1+7x_2+3x_3+2x_4=4$

   $7x_1+4x_2+5x_3+7x_4=3$

4. Explain the graphical method of solving an LPP.

Contd...2

5. Write down the dual of the following LPP

Max $Z = 5x_1 + 12x_2 + 4x_3$ subject to

$$x_1 + 2x_2 + x_3 \leq 5$$
$$2x_1 - x_2 + 3x_3 \leq 2$$
$$x_1 \geq 0, \ x_2 \geq 0 \text{ and } x_3 \text{ is unrestricted in sign}$$

6. What are the advantages of maintaining inventory in a firm?

7. Explain the dominance principle of reducing the size of two person zero sum game.

8. How do you find an initial basic feasible solution to a transportation problem by North West Corner Rule?

9. Write a short note on Dual LPP.

10. What do you mean by network? Explain the role of network in project scheduling.

PART – C

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

11. a) Define LPP. Give an example of an LPP with the objective function
    i) to be minimized   ii) to be maximised
    b) State the Simplex Algorithm for solving an LPP.

12. a) Show that Transportation problem is a special case of LPP.   (5+5)
    b) Explain the method of testing the optimality of a basic feasible solution by MPDI method.

13. a) Show that in a AP the optimal assignment remains unchanged when we substract a constant from each element in a row.   (3+7)
    b) Explain the graphical method of solving a game.

14. Derive an expression for the EOQ in case of uniform demand, instantaneous production where shortages are allowed.   (5+5)

15. a) What do you mean by price breaks? Explain the procedure of finding EOQ with two price breaks.   (10)
    b) Derive the criterion for solving a Newspaper Boy Problem.

16. a) Explain the algebraic method of solving a zero sum two person game with no saddle point.   (5+5)
    b) Define optimistic, Pessimistic mean times. Write down the PERT algorithm.   (4+6)

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(2014 Batch onwards)

G 507.6a

Reg. No.

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
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. What is osmotic pressure?
2. Define aeroponics.
3. What is field capacity?
4. What is hydathode? Mention its function.
5. Define red drop.
6. Write the role of RUBISCO in photosynthesis.
7. Define glycerophosphate shuttle.
8. Mention the role of auxins in geotropism.
9. Define chemosynthesis.
10. Give reasons for vernalisation.
11. What is circummutational movement?
12. What are orthodox and recalcitrant seeds?

SECTION – B

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

1. Write a note on the relationship between Ψ, Ψ_s and Ψ_p.
2. Transpiration is a necessary evil. Justify.
3. Explain Hydroponics.
4. Describe Blackman's law of limiting factors.
5. What is respiratory quotient ? Explain with suitable examples.
6. Explain Crassulacean acid metabolism.
7. Explain sciesmonastic movements.
8. Write a short note on growth curve.
9. Explain the chemical nature and physiological effects of ABA.

SECTION – C

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

1. Describe different types of Active absorption of water in plants.
2. Describe transpiration pull theory of Ascent of sap. Add a note on its demerits.
3. Give a detailed account of Kreb's cycle.
4. Describe the different steps of Calvin cycle.
5. Describe non cyclic photophosphorylation.
6. Describe practical applications of Auxins.
7. Describe photoperiodism. Add a note on photoperiodic induction.
8. Write any five important reasons for seed dormancy. Explain any five methods used to break the seed dormancy.
9. Describe the sugar conversion theory of stomatal movements.

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G 507.6a   Reg. No. [ ][ ][ ][ ][ ][ ]

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
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 <u>TEN</u> of the following in a few sentences each.   (10×2=20)

1. What is osmotic pressure?
2. Define aeroponics.
3. What is field capacity?
4. What is hydathode? Mention its function.
5. Define red drop.
6. Write the role of RUBISCO in photosynthesis.
7. Define glycerophosphate shuttle.
8. Mention the role of auxins in geotropism.
9. Define chemosynthesis.
10. Give reasons for vernalisation.
11. What is circummutational movement?
12. What are orthodox and recalcitrant seeds?

SECTION – B

Answer any <u>SIX</u> of the following.   (6×5=30)

1. Write a note on the relationship between Ψ, Ψ_s and Ψ_p.
2. Transpiration is a necessary evil. Justify.
3. Explain Hydroponics.
4. Describe Blackman's law of limiting factors.
5. What is respiratory quotient ? Explain with suitable examples.
6. Explain Crassulacean acid metabolism.
7. Explain sciesmonastic movements.
8. Write a short note on growth curve.
9. Explain the chemical nature and physiological effects of ABA.

SECTION – C

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

1. Describe different types of Active absorption of water in plants.
2. Describe transpiration pull theory of Ascent of sap. Add a note on its demerits.
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8. Write any five important reasons for seed dormancy. Explain any five methods used to break the seed dormancy.
9. Describe the sugar conversion theory of stomatal movements.

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(2014 Batch onwards)

G.507.6b   Reg. No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
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 their applications.

2) State the underlying principle and uses of Soxhlet extraction.

3) Give the biological source and uses of any two crude drugs containing phenolics.

4) What are somaclonal variations? Mention any two applications.

5) What is biosafety? Name any one regulatory body.

6) List four factors affecting the cultivation of medicinal plants.

7) What is pharmacogenomics?

8) Differentiate between primary and secondary metabolism.

9) Write the significance of Citric acid pathway in metabolism.

10) Give any two applications of pollen culture.

11) What is leaf microscopy? How is it sued in crude drug evaluation?

12) Mention any two properties of lipids as crude drug with an example.

SECTION – B

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

1) Explain the switch off mechanism in Lac operon regulation.

2) Give the salient features of Homeopathy and Siddha system of medicines.

3) Describe the therapeutic uses rendered by proteins in crude drugs.

4) Explain the methods of protoplast isolation. Mention the significance of protoplast culture.

5) Explain the types of ergastic substance with significance.

6) Write a brief note on glycosides based crude drugs.

7) What are organized drugs? Mention any four different sources with examples.

8) What are synthetic seeds? Write a note on their applications.

9) Explain the source, properties and uses of Resins and Steroids.

SECTION – C

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

1) Explain the mechanism of a) RNA editing   b) Gene silencing

2) Describe the steps involved in the production of Bt cotton.

3) Give an account on anatomical evaluation of crude drugs.

4) Write the principle, procedure and applications of thin layer chromatography.

5) Explain Pentose Phosphate pathway and add a note on its significance.

6) Write a note on tissue culture media and sterilization of explants.

7) Discuss the types of substitutes and adulterants with examples.

8) Write the schematic representation of Shikmick acid pathway and add a note its significance.

9) Give an account on the source and therapeutic properties of Tannins and Flavanoides.

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(2014 Batch onwards)

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Reg. No.: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
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) What are macrophages? Write their functions.

b) What are primary lymphoid organs? Give two examples.

c) Define vaccine. Give one example for bacterial vaccine.

d) Write the symptoms of typhoid.

e) Which is the causative agent of – i) dengue   ii) giardiasis

f) Write a note on signet-ring stage.

g) What are the routes of administration of toxicant?

h) Name any two diseases of silkworm.

i) Define induced breeding? Name any one hormone used in induced breeding of fishes.

j) Write any two economic importance of bee wax.

k) Mention two methods of housing management of poultry.

l) Name different stages in the life cycle of earthworm.

PART – B

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

Unit I

II a) Explain the structure and functions of Immunoglobulin G.   (10)

   b) Write a note on autoimmunity.   (5)

   c) Explain viral vaccines with suitable examples.   (5)

OR

III a) Give a detailed account on arthritis.   (10)

   b) Enumerate the differences between T cells and B cells.   (5)

   c) Explain the features of innate immunity.   (5)

Unit II

IV a) Explain any two viral parasitic diseases that you have studied. (10)

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

   c) Explain the mode of transmission of - i) *Wuchereria*

                                              ii) *Plasmodium*   (5)

OR

V a) Explain the life cycle of *Ascaris* with neat labeled diagram.   (10)

b) Explain the transmission and mode of infection of *Trichomonas*.   (5)

c) Write a note on measles.   (5)

Unit III

VI a) Give a detailed account on impact of pesticide pollution on human population.   (10)

b) Explain briefly the techniques of rearing pearls.   (5)

c) Classify indigenous breeds of cattles with two examples for each.   (5)

OR

VII a) Give a detailed account on feeding and raising of different classes of dairy animals.   (10)

b) Write a note on non-mulberry silk.   (5)

c) Explain the methods of transporting seed fish and brood fish.   (5)

Unit IV

VIII a) Explain the pests of honey bees. Add a note on diseases of honey bees and their control measures.   (10)

b) Write a note on broilers and layers.   (5)

c) Give the ecological classification of earthworms.   (5)

OR

IX a) Give a detailed account on preparation, packing, storage and marketing of vermicompost.   (10)

b) Write a note on management of bee keeping.   (5)

c) Give a brief account of economic importance of poultry.   (5)

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(2014 Batch onwards)

G.508.6b   Reg. No.: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
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 <u>TEN</u> of the following.   (10X2=20)

a) Define habituation. Give an example.

b) Mention different types of individuals in a honeybee colony.

c) Name the castes in a termite colony.

d) In connection with 'courtship behaviour', what is dancing? Give example.

e) Explain Parental care in *Tilapia*.

f) Define anadromous migration with an example.

g) Name the molecules of pre biotic atmosphere.

h) What is survival of fittest?

i) Define isolation.

j) List any four characters of modern man.

k) Define analogus organ with an example.

l) Name any four dinosaurs.
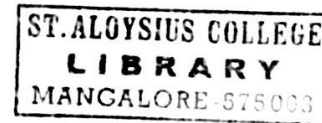
PART – B

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

Unit I

II a) Explain social behaviour in honey bee.   **(10)**

   b) Write a note on acoustic communication with example.   **(5)**

   c) With reference to innate behaviour, explain motivation.   **(5)**

OR

III a) Write a note on foraging behaviour.   **(10)**

    b) Explain social organization in ants.   **(5)**

    c) With reference to learnt behaviour, explain condition reflex. **(5)**

Unit II

IV a) Explain courtship behaviour in birds.   **(10)**

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

   c) Write a note on nesting behaviour in wasps.   **(5)**

OR

G.508.6b

V a) Give detailed account of catadromous migration in eel. (10)

   b) Explain courtship behaviour in spiders. (5)

   c) What is biological clock? Write a note on circadian rhythm. (5)

Unit III

VI a) What is industrial melanism? How does it provide evidence for evolution? (10)

   b) How was the theory of abiogenesis disproved? (5)

   c) What is adaptive radiation? Explain with reference to Darwin's finches. (5)

OR

VII a) Explain the theory of chemical evolution of life. (10)

   b) Give an account of evidences of organic evolution from biochemistry. (5)

   c) With reference to synthetic theory, explain – I) gene pool
      ii) genetic drift (5)

Unit IV

VIII a) Give a detailed account of evolution of horse. (10)

   b) Give a brief account of micro evolution. (5)

   c) Write a note on methods of fossilization. (5)

OR

IX a) Give an account of extinction, its causes and effects. (10)

   b) How does *Archaeopteryx* form palaeontological evidence for evolution? (5)

   c) Write a note on types of fossils. (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 - 2017
MICROBIOLOGY – Paper VII
Principle of Bacterial Genetics, Genetic Engineering and Bioinformatics

Time: 3 Hours   Max. Marks:100

Instructions: Draw diagrams wherever necessary
Answer questions from Part A, B and C

PART – A

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

  a) Insertion sequence transposons

  b) Termination Codon.

  c) Primase

  d) Phenotypic variation of mutation.

  e) Tautomer

  f) Shuttle Vectors

  g) Yac Vector

  h) Bioterrorism

  i) FASTA

  j) Protein Bank

  k) ORF

  l) BLAST

PART B

ANSWER QUESTION 'a' OR 'b' AND 'c 'IS COMPULSORY FROM EACH UNIT.
(15x4=60)

UNIT – I

2. a) Explain the Watson and Crick Model of DNA.

OR

2. b) Explain the Gene Regulation in bacterial cells with reference to Lac   (9)
operon.

2. c) Explain the types of plasmids.   (6)

UNIT – II

3. a) Explain mutations produced by chemicals.

OR

3. b) Explain the mechanism of transformation in prokaryotes.   (9)

3. c) Write a short note on mutation as a tool in molecular genetics.   (6)

UNIT – III

4. a) Explain the production of transgenic plants.

OR

4. b) Explain in detail polymerase chain reaction. (9)

4. c) Write briefly on plasmid vectors used in genetic engineering. (6)

UNIT – IV

5. a) Explain in detail bioinformatic databases.

OR

5. b) Explain gene content of prokaryotic genomes. (9)

5. c) Write a short note on sequence alignment. (6)

PART –C

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

6. a) Specialized transduction.

   b) Characteristics of genetic code

   c) DNA mismatch repair

   d) G.M Foods

   e) Southern Blotting.

   f) Small and large prokaryotic genomes

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(2014 Batch onwards)

G 509.6b   Reg. No. ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI- Degree Examination
April - 2017
MICROBIOLOGY – Paper VIII
Applied Microbiology

Time: 3 Hours   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   (2×10=20)

   a) Baffles

   b) TA Spoilage

   c) RODAC

   d) Oxidation reduction potential

   e) Radurization

   f) *Penicillium chrysogenum*

   g) Lager

   h) Malting

   i) Brewery

   j) Fermentor

   k) Aflatoxins

   l) Preservatives
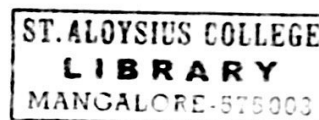
PART B

ANSWER QUESTION 'a' OR 'b' AND 'c 'IS COMPULSORY FROM EACH UNIT.

(15x4=60)

UNIT – I

2. a) Explain preservation of food using high temperature.

OR

2. b) Explain the sources by which food is contaminated.   (9)

2. c) Write a note on effects of radiation on food.   (6)

UNIT – II

3. a) Describe the biochemical activities of microbes in milk.

OR

3. b) Explain types of spoilage of fruits and vegetables.   (9)

3. c) Write a note on dye reduction tests.   (6)

UNIT – III

4. a) Explain the industrial production of wine.

OR

4. b) Write a note on types of media used in industrial fermentation.　　(9)

4. c) Write a note on foam control and temperature control in a fermentor.　(6)

UNIT – IV

5. a) Explain the process of production of single cell protein.

OR

5. b) Explain the different methods of vinegar production.　　(9)

5. c) Write a note on semi synthetic penicillins.　　(6)

PART –C

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

6. a) Botulism.

　b) Impellers in fermenter

　c) MPN

　d) Solid state fermentation

　e) Aeration in fermentor

　f) Intrinsic factors for microbial growth in food.

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(2013 batch onwards)

G 510.6a

Reg. No: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI– Degree Examination
April- 2017
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) What is culture media? Give an example.

   b) What are psychrotrophs?

   c) Name the primary & counter stains used in Gram's staining.

   d) What is bacteriophage? Give an example.

   e) Differentiate between antigenicity and immunogenicity.

   f) What are monoclonal antibodies?

   g) Mention the immunological role of thymus.

   h) Give an example for immunosuppressive agents and mention its clinical use.

   i) Write the importance of FSH.

   j) Mention the importance of DAG as a secondary messenger.

   k) Name the hormones that helps in reabsorption of water and Na^+ ions.

   l) What are Endospores?

PART – B

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

2. Mention the contributions of Edward Jenner and Robert Koch in the field of microbiology.

3. Explain pour plate & streak plate methods for isolation and purification of microbial cultures.

4. Write a note on morphology of TMV.

5. Explain the characteristics of adaptive immunity.

6. Write a note on hormones of posterior pituitary gland.

7. Write a note on SCID.

8. Name one function of the following hormones.
    i) Glucagon   ii) Adrenaline   iii) Somatotropin   iv) Prolactin   v) CRH

9. Explain the concept of secondary messenger with respect to CAMP.

PART -C

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

10. What is sterilization? Explain chemical methods of sterilization.

11. Explain i) Acid fast staining   ii) Phases of microbial growth curve

12. Write a note on antigen-antibody interactions with suitable examples.

13. What are stem cells? Write a note on their general properties, classification and clinical use.

14. Explain briefly autoimmune disorders.

15. What are immunoglobulins ? Name the types and give their functions.

16. Explain the features, functions and general mechanism of peptide and steroid hormone action.

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(2013 batch onwards)

Reg. No: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI– Degree Examination
April - 2017
### BIOCHEMISTRY - Paper VIII
Clinical and Membrane Biochemistry

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) Write the clinical symptoms of Diabetes mellitus.
   b) List out the abnormal constituents of urine.
   c) What is the normal value of FBS & RBS
   d) What is the significance of creatinine in urine.
   e) Define half life.
   f) What is the significance of amylase in pancreatitis?
   g) Differentiate plasma and serum.
   h) What is meant by symport system? Give example.
   i) What are the causes for Niemann- Pick disease?
   j) Define curie and RAD.
   k) Differentiate benign and malignant tumors.
   l) Name any two chemical carcinogens.
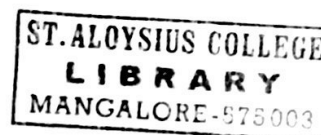
PART – B

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

2. Discuss the significance of ALT and SGPT.
3. Write a note on phenylketonuria and sickle cell anemia.
4. Give an account on unit membrane hypothesis.
5. Explain the methods of safe disposal of radioactive wastes.
6. Explain the mechanism of phagocytosis.
7. Explain the mechanism of free radical generation.
8. Write a note on serum Lipid profile.
9. Explain the biological functions of plasma membrane.

PART -C

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

10. a) Discuss the clinical significance of urea, uric acid and pigments in urine. (6)
    b) Write a note on LDH (4)

11. Explain the different types of membrane transport systems.

12. a) Write a note on Atherosclerosis (3)
    b) Discuss the variation of glucose and bilirubin in blood during pathological conditions. (7)

13. a) Explain Fluid -mosaic model. (5)
    b) Write a note on ionophores (5)

14. a) Give the characteristics of tumor cells. (5)
    b) Explain the role of drugs in cancer treatments. (5)

15. Give an account on scintillation counter.

16. Explain the types of lipoproteins with their functions.

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
April - 2017
BIOTECHNOLOGY-Paper VII
## Environmental Biotechnology

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) Define ammonification.
   b) Define Ammensalism. Give an example.
   c) What is allergen? Give an example.
   d) Give two examples for Methanogens.
   e) Mention causative agent of a) Cholera b) TB
   f) Define CRZ. Mention the areas covered in CRZ.
   g) List any two properties of *Azatobacter*.
   h) Define COD.
   i) What is composting?
   j) List any two advantages of biopesticides.
   k) Write the composition of biogas.
   l) What is bioleaching?
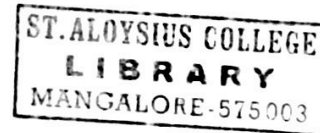
PART – B

Answer any **SIX** of the following.

(6×5=30)

2. Write a note on phosphorous cycle.
3. Explain Anderson sampler technique.
4. What is land filling? Explain.
5. Give a detailed account on causes and effects of air pollution.
6. Describe the biomining of copper.
7. What are energy gardens? Explain with suitable examples.
8. Describe microbial degradation of xenobiotics with suitable examples.
9. Explain production of blue green algae as a biofertilizer.
10. Describe microbial production of hydrogen.

PART – C

Answer any **FIVE** of the following.

(5×10=50)

11. Discuss Nitrogen cycle and its significance.
12. Describe the qualitative methods of analyzing soil microbes.
13. Discuss a) Trickling filter b) oxidation ponds.
14. Explain water borne bacterial diseases in detail.
15. Give a detailed account on renewable ad nonrenewable energy resources.
16. Write a detailed account on role of mycorrhiza and sea weeds in crop production.

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester VI – Degree Examination
April - 2017
BIOTECHNOLOGY – Paper VIII
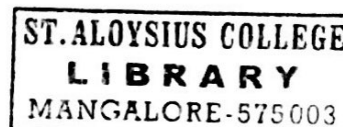### BIOPROCESS TECHNOLOGY

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 tropophase and idiophase.

b) Mention the advantages of bioprocess over chemical process.

c) Mention the aeration system in fermenters.

d) Define role of ammonia in the fermentation media.

e) Mention the organisms that produces α-amylase.

f) What are Abzymes?

g) Mention the enzymes used in starch and textile industry.

h) Mention the use of HRP in therapeutics and diagnostics.

i) Define aflatoxins.

j) Mention the microbial flora present in fresh fruits and vegetables.

k) Define acidity and pickling.

l) Mention the organisms that cause the spoilage of food.

PART - B

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

2. Describe the importance of upstream and downstream processing in bioprocess technology.

3. Briefly explain the growth kinetics of batch culture.

4. Explain gel filtration chromatography.

5. Give an account on strain selection and improvement.

6. Explain the industrial production of vitamin B12.

7. Explain SGOT and SGPT in therapeutics and diagnostics.

8. Explain the mode of action and symptoms of Botulism.

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9. Explain pasteurization. Add a note on phosphatase test of pasteurized milk.

10. Explain probiotics and prebiotics.

PART – C

(5×10=50

Answer any FIVE of the following.

11. With a neat labelled diagram, explain the basic design of a fermenter and add a note on criteria used in its design.

12. Describe the design of media for fermentation.

13. Briefly explain the secondary screening of organisms producing important metabolites.

14. Describe the techniques of immobilization.

15. Give a detailed account on mushroom culture. Add a note on their nutritional value.

16. Explain the techniques involved in preservation of food.

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