

(2014 Batch Onwards)

G 501.6a

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**St Aloysius College (Autonomous)****Mangaluru****B.Sc. Semester VI- Degree Examination****April - 2018****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) Give the empirical relation between range and velocity of an alpha particle.
- b) Define impact parameter. What is its value for head-on collision?
- c) What is meant by nuclear spin?
- d) What are isomers? Give one example.
- e) What are transuranic elements? Give an example.
- f) What is an Op-amp? Draw the symbol of an op-amp.
- g) What do you mean by cross-section for nuclear reaction? Write its unit.
- h) Mention any four properties of the neutron.
- i) Explain positive feedback.
- j) For the non-inverting amplifier, given that input voltage is 0.5V and  $R_1 = 1K\Omega$  and  $R_f = 10K\Omega$ . Calculate the output voltage.
- k) Define critical size for a nuclear reactor.
- l) What is pair production?

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

2. a) With elements A, B and C forming radioactive series (C being stable), derive an expression for the number of atoms of B if at the start, B was not present in the sample. (6)
- b) Explain any four characteristics of nuclear force. (4)
3. a) Derive the  $\alpha$  particle scattering formula, assuming the expression for impact parameter. (6)
- b) Explain the quark model for structure of hadrons. (4)
4. a) Deduce the semi-empirical formula for nuclear mass on the basis of liquid drop model. (6)
- b) Write a note on cosmic ray showers. (4)

**UNIT – II**

5. a) Distinguish between endoergic and exoergic reactions. Deduce the expression for threshold energy in an endoergic reaction. (6)
- b) Write a short note on fast breeder reactors. (4)

Contd...2

**G 501.6a**

6. a) Describe the working of a G.M tube with the necessary diagram. (6)  
 Explain the characteristics of G.M tube. (4)
- b) Describe the working of a semiconductor detector. (4)
7. a) Describe the working of betatron. Derive an expression for the final energy of electrons in a betatron. (6)
- b) With a neat diagram, describe the construction and working of a cyclotron. (4)

**UNIT – III**

8. a) Explain the theory of lead-lag network. Draw the circuit of wein-bridge oscillator using Op-amp and explain its working. (6)
- b) Explain the need of a buffer amplifier. How is it realized using an Op-amp? (4)
9. a) Draw the diagram of a CE amplifier using voltage divider bias. Explain the method of obtaining its DC and AC load line. (6)
- b) Explain how phase inversion takes place in a CE amplifier. (4)
- 10.a) Explain how sustained oscillations are obtained with the help of positive feedback. Draw the circuit of RC phase shift oscillator using transistor and explain its working. (6)
- b) What is a non-inverting amplifier? Obtain the expression for the voltage gain of an inverting amplifier. (4)

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

11. Calculate the time required for 10% of a sample of thorium to disintegrate. Half-life of thorium is  $1.4 \times 10^{10}$  years.
12. Singly charged ions of mass 24 amu and 25 amu accelerated through a potential difference of 2000 volt enter a uniform magnetic field of 0.1 tesla. What should be the distance between two slits arranged to collect these ions after they have travelled semicircular paths?
13. Calculate the mass in kg of Radium-226 having an activity of 10 curie and half life 1600 years.
14. Find the threshold energy of the nuclear reaction  ${}^{14}_7\text{N}(n,\alpha){}^{11}_5\text{B}$ . Given mass of  ${}^{14}_7\text{N} = 14.003074$  amu. Mass of  ${}^{11}_5\text{B} = 11.009305$  amu; mass of  ${}_0^1\text{n} = 1.0086665$  amu; mass of  $\alpha$ -particle = 4.002603 amu.
15. For the subtractor circuit using an op-amp. Input voltages are  $V_1 = 5\text{V}$  and  $V_2 = 2\text{V}$ ;  $R_1 = 10\text{K}$  and  $R_2 = 20\text{K}$  and  $R_f = 47\text{K}$  respectively. Calculate the output voltage.
16. The diameter of the dees of a cyclotron is 2 m and the applied field strength is 0.72T. Calculate the energy gained by the protons from the accelerator given charge on the proton  $= 1.602 \times 10^{-19}\text{C}$ .

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(2014 Batch Onwards)

G 501.6b

Reg. No. :

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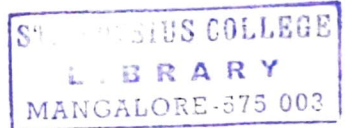
**St Aloysius College (Autonomous)**  
**Mangaluru**  
**B.Sc. Semester VI- Degree Examination**  
**April - 2018**  
**PHYSICS – Paper - VIII**  
**COMMUNICATION AND DIGITAL ELECTRONICS,**  
**SPECIAL PROPERTIES OF MATERIALS**

Time: 3 hrs.

Max Marks: 100

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

- 1.a) What are side band frequencies in AM? What are the frequency components in them?
- b) Mention any two limitations of AM.
- c) What are the major components of a cathode ray tube?
- d) Which are the three primary colours?
- e) Give the logic symbol and Boolean expression of an OR operation.
- f) What is a full-adder? Give its logic block diagram.
- g) What is a counter?
- h) What is an Edge-triggered Flip-flop?
- i) What is isotope effect?
- j) What are nano-materials?
- k) What is the effect of external magnetic field on superconductor?
- l) Write the expression for polarization vector in a non-linear dielectrics.

**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) Define modulation index. Obtain a relation for the same in terms of  $V_{max}$  and  $V_{min}$ . **(4)**
3. a) Describe FM radio transmitter with a block diagram. **(6)**
- b) Give a comparison between AM and FM. **(4)**
4. a) Explain the theory of colour mixing in TV receivers. **(6)**
- b) Draw a block diagram of a CRT and mention the functions of its various sub-systems. **(4)**

**UNIT – II**

5. a) What is an AND gate? Explain its construction using diodes and show that its truth table can be realized using various conditions for input. **(6)**
- b) Explain the working of a NOT gate using a transistor. **(4)**

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**G 501.6b**

6. a) With a circuit, show how a XOR gate can be constructed using a combination of NOT, AND and OR gates. Also realize XOR gate using NAND gates. (6)
- b) State and prove De-Morgan's second theorem. Represent these theorems using logic gates. (4)
7. a) Explain the working of 3 bit- binary counter using JK flip-flop. (6)
- b) With a neat diagram discuss the working of D-flip flop and give its truth table. (4)

**UNIT - III**

8. a) What is the effect of external magnetic field on superconductivity? Explain Meissner effect. (6)
- b) What are type-I superconductors? Explain. (4)
9. a) Discuss the various types of nanoscale systems. Explain the structure of carbon nano-tube and its properties. (6)
- b) Explain the generation of second harmonics in nonlinear media. (4)
- 10.a) Explain the characteristics properties of superconductors. (6)
- b) Give the applications of superconductors. (4)

**SECTION - C****Answer any FOUR of the following:****(4x5=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 this 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. Find the percentage of power saving, if one of the side band is suppressed.
13. A sinusoidal carrier wave of frequency 1MHz and amplitude 50V is amplitude modulated by a sinusoidal audio frequency 10KHz. If the modulation index is 80%, calculate the side band frequencies and corresponding amplitudes. Also calculate the required bandwidth.
14. Using Boolean identities show that -
- a)  $AB + A\bar{B} = A$
- b)  $(A + B)(A + \bar{B}) = A$
- c)  $A + AB = A$
15. Simplify  $Y = \bar{A}B\bar{C} + A\bar{B}C + ABC$
16. The transition temperature of mercury with average atomic mass of 200.59 amu is 4.153K. Calculate the transition temperature of one of the isotopes  ${}_{80}\text{Hg}^{204}$ .

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2014 batch onwards

G 502.6a

Reg. No.

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**St Aloysius College (Autonomous)****Mangaluru****B.Sc. Semester VI – Degree Examination****April – 2018****CHEMISTRY- PAPER VII**

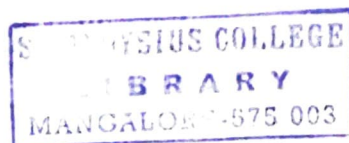
Time: 3 hrs.

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) Dipole moment of carbon dioxide is zero. But one of its Vibration is IR active why?
- b) Mention any two advantages of Raman spectroscopy.
- c) What is the selection rule in vibrational spectroscopy?
- d) Write Gibb's phase rule and explain the terms.
- e) What is trans effect?
- f) What are organometallic compounds? Give example.
- g) What are metal carbonyls?
- h) Give the IUPAC name of
  - i)  $C_2H_5MgCl$
  - ii)  $Ni(CO)_4$ .
- i) What are chiral molecules? Give an example.
- j) What are enantiomers? Give an example.
- k) Write alkylation reaction of ethyl aceto acetate.
- l) Define the term 'Conformation'.

**PART – B**2. Answer any **TEN** of the following questions in 2 to 5 sentences**(3x10=30)**

- i) Explain vibrational energy levels of an anharmonic oscillator.
- ii) An organic compound with molecular formula  $C_6H_5NH_2$  shows. IR absorption bands at  $3000\text{ cm}^{-1}$ ,  $3400\text{ cm}^{-1}$ ,  $3500\text{ cm}^{-1}$ ,  $1600\text{ cm}^{-1}$ ,  $1580\text{ cm}^{-1}$ ,  $1460\text{ cm}^{-1}$ ,  $1300\text{ cm}^{-1}$ . Assign the bands and write the structure of the compound.
- iii) Explain the formation of stokes and antistokes lines in Raman spectra.
- iv) Write a note on freezing mixture.

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**G 502.6a**

- v) Define stepwise and overall stability constants. Give the relationship between them.
- vi) Differentiate between thermodynamic and kinetic stability of metal complexes.
- vii) How is aryl lithium prepared? Write any two applications.
- viii) Explain the nature of bonding in metal carbonyls.
- ix) Explain geometric isomerism in oximes.
- x) Discuss the optical isomerism exhibited by lactic acid.
- xi) Give the synthesis of alkyl acetic acid from malonic ester.
- xii) Explain the synthesis of ethyl aceto acetate.

**PART - C**

**Answer any TEN of the following questions**

**(5x10=50)**

3. What is the condition for a molecule to show vibrational spectrum. Discuss the energy levels of a simple harmonic oscillator.
4. Explain the applications of I.R. spectra.
5. What are the advantages of Raman spectroscopy over IR spectroscopy?
6. Explain the phase diagram of sulphur system.
7. Explain any one method of determination of stability constant.
8. Explain the substitution reaction in square planar complexes.
9. Give the classification of organometallic compounds based on nature of bond. Give example for each type.
10. How does I.R spectroscopy help in explaining bonding in metal carbonyls?
11. Explain the conformational analysis of 1,2-dichloro ethane.
12. Discuss the optical isomerism exhibited by tartaric acid.
13. Explain keto-enol tautomerism in ethyl aceto acetate. Write supporting reactions for keto and enol forms of ethyl aceto acetate.
14. How are the following synthesised from ethyl aceto acetate
  - i) diketone
  - ii) dicarboxylic acid

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G.502.6b

(2014 Batch onwards)

Reg. No.:

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**St Aloysius College (Autonomous)  
Mangaluru**

**B.Sc. Semester VI – Degree Examination**

**April - 2018**

**CHEMISTRY – PAPER VIII**

**Time: 3 Hours.**

**Max Marks: 100**

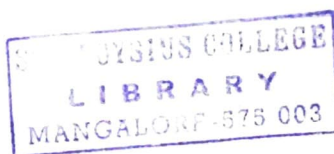
**Instructions:**

- 1. Write the question number and sub division 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 or 3 sentences. (2X10=20)**

- 1.a) What is liquid junction potential?
- b) What is meant by activity and activity coefficient?
- c) Write Debye-Huckel Onsager equation and explain the terms involved in it.
- d) Write two advantages of conductometric titrations.
- e) What is meant by photochemical smog?
- f) Mention the composition of water gas.
- g) What is octane number?
- h) Mention the need of green chemistry.
- i) What are dyes? Mention any two types.
- j) What is meant by chemical shift?
- k) Define coupling constant.
- l) What are alkaloids?



**PART – B**

**Answer any TEN of the following questions in 2 to 5 sentences. (3X10=30)**

2. i) Explain the construction and working of glass electrode.
- ii) Explain relaxation effect?
- iii) Explain the determination of pH using quinhydrone electrode.
- iv) Explain how is degree of ionisation of an electrolyte determined by conductance measurement?
- v) Explain green house effect and acid rain.
- vi) Explain annealing of glass. Explain.
- vii) What are propellants? Give different types with examples.
- viii) Calculate the atom economy of a green reaction with an example.
- ix) Explain the action of phenolphthalein as indicator.
- x) What is meant by nuclear shielding and deshielding?
- xi) Explain spin-spin coupling with an example.
- xii) Explain the extraction of alkaloids from plants.

**PART - C**

(5X10=50)

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

3. Describe the moving boundary method of determining transport number of an ion.
4. Describe the potentiometric titration of Mohr's salt against Potassium dichromate.
5. Explain the conductometric titration of mixture of acids against strong base.
6. Describe the construction and working of calomel electrode.
7. Write a note on air pollution.
8. Explain the manufacture of biogas.
9. Give the classification of glass with an example for each type.
10. Explain the any five principles of green chemistry.
11. Give the method of synthesis of methyl orange and crystal violet.
12. Explain the NMR spectra of ethyl acetate and ethyl bromide.
13. Explain any two factors affecting chemical shift.
14. Explain the elucidation of structure of nicotine.

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(2014 Batch onwards)

G 503.6

Reg. No:

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**St Aloysius College (Autonomous)**  
Mangaluru  
B.Sc. Semester VI – Degree Examination  
April - 2018

**MATHEMATICS – Paper VII**

Partial differential equations, Fourier Series and Linear Algebra

Time: 3 Hours

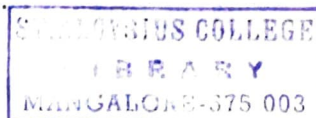
Max. Marks: 100

Note: Answer all parts

**PART – A**Answer any **TEN** of the following.

(10×2½=25)

- Verify the condition of integrability of the differential equation  
 $2yzdx + zxdy - xy(1+z)dz = 0$ .
- Solve:  $(x^2y - y^3 - y^2z)dx + (xy^2 - x^2z - x^3)dy + (xy^2 + x^2y)dz = 0$ .
- Solve:  $\frac{dx}{x^2y} = \frac{dy}{z^2x} = \frac{dz}{yx}$ .
- In the Fourier series expansion of  $f(x) = 4 - x^2$ ,  $-2 < x < 2$ , find  $a_0$ .
- Find the half range cosine series of  $f(x) = x$ ,  $0 < x < \pi$ .
- Find  $b_n$  in the Fourier series expansion of  $f(x) = 1 + x$  in  $(-1, 1)$ .
- Prove that the intersection of two subspaces is also a subspace of the vector space  $V$ .
- If  $S$  is a subset of a vector space  $V$ , then prove that  $L(S)$  is a subspace of  $V$ .
- Prove that  $(2, 3)$ ,  $(4, 5)$  and  $(1, 2)$  are linearly dependent.
- Prove that sum of two linear transformations is a linear transformation.
- Prove that image of a linear transformation is a subspace.
- Prove that a linear transformation  $T$  is an isomorphism iff  $m(T)$  is non singular.
- If  $A \in M_n(F)$  has  $q(x)$  as the minimum polynomial and  $f(A) = 0$  then prove that  $q(x) | f(x)$ .
- Define minimum polynomial of a matrix  $A \in M_n(F)$ .
- Prove that  $Tr(AB) = Tr(BA)$ .

**PART – B****UNIT - I**Answer any **THREE** of the following.

(3×5=15)

- Solve:  $xydx + (x^2y - zx)dy + (x^2z - xy)dz = 0$ .
- Solve:  $(2xy - yz)dx + (2yz - zx)dy + (x^2 - xy + y^2)dz = 0$
- Solve:  $(y + z)dx + (z - x)dy - (x + y)dz = 0$  by the method of auxiliary equation.

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G 503.6

4. Solve:  $(yz + z^2) dx - xz dy + xydz = 0$ .
5. Solve the simultaneous equations:  $\frac{dx}{z(x+y)} = \frac{dy}{z(x-y)} = \frac{dz}{x^2 + y^2}$ .

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

1. Obtain the Fourier series for  $f(x) = e^{-x}$  in the interval  $0 < x < 2\pi$ .
2. Expand  $f(x) = x^2$  in a Fourier series over the interval  $(-p, p)$ . Hence show that

$$\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \dots = \frac{\pi^2}{12} \text{ in } (-\pi, \pi).$$

3. Obtain the half range cosine and sine series for  $f(x) = \pi - x$  in  $[0, \pi]$ .
4. Find a Fourier series for the function

$$f(x) = \begin{cases} -1, & -1 < x < 0 \\ 0, & x = 0 \\ 1, & 0 < x < 1 \end{cases}.$$

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

1. a) Define a homomorphism and Kernel of a homomorphism.  
b) Define a subspace and prove that Kernel of a homomorphism is a subspace.
2. If  $V$  is finite dimensional and  $W$  is a subspace of  $V$ , then prove that  $\dim W \leq \dim V$  and  $\dim \frac{V}{W} = \dim V - \dim W$ .
3. Prove that the vectors  $v_1, v_2, \dots, v_n$  in a vector space  $V$  are either linearly independent or some  $v_k$  is a linear combination of the preceding ones.
4. State and prove Schwartz's inequality.
5. Let  $V$  be a finite dimensional inner product space. Prove that  $V$  has an orthonormal set as the basis.

**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  $\alpha_1, \alpha_2, \dots, \alpha_n$  is nonsingular if and only if the vectors  $T(\alpha_1), T(\alpha_2), \dots, T(\alpha_n)$  are linearly independent.
2. Let  $\beta_1, \beta_2, \dots, \beta_m$  be a basis for a vector space  $V$  and  $\alpha_1, \alpha_2, \dots, \alpha_m$  belong to the vector space  $W$ . Then prove that there exists a unique linear transformation  $T: V \rightarrow W$  such that  $T(\beta_i) = \alpha_i$  for each  $i$ .
3. Let  $V$  and  $V'$  be vector spaces of dimensions  $m$  and  $n$  respectively. Then prove that dimension of  $L(V, V')$  is  $mn$ .

4. Prove that dimension of the domain is equal to  $rank + nullity$ .
5. If  $A = m(T)$  with respect to the basis  $v_1, \dots, v_n$  and  $B = m(T)$  with respect to the basis  $w_1, \dots, w_n$  then prove that there exists a non singular matrix  $C$  such that  $B = CAC^{-1}$ .

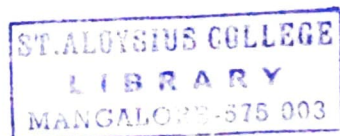
**UNIT - V**

Answer any **THREE** of the following.

(3x5=15)

1. Find the inverse of the matrix  $\begin{bmatrix} 3 & -1 & 2 \\ 2 & 1 & 1 \\ 1 & -3 & 0 \end{bmatrix}$  using elementary row operations.
2. If  $A \in M_n(F)$  then prove that there exists  $f(x) \in F[x]$  such that  $f(A) = 0$ .
3. Prove that two similar matrices have the same minimum polynomial.
4. State and prove Cayley Hamilton theorem.
5. Find the rank of the matrix  $\begin{bmatrix} 2 & 3 & -1 \\ -1 & 0 & 4 \\ 4 & 5 & 8 \end{bmatrix}$  using the method of row reduction.

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(2007 Batch onwards)

G 503.6b(ii)

Reg. No. :

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

**B.Sc. Semester VI – Degree Examination**  
April - 2018

**MATHEMATICS – Paper VIII**  
**NUMERICAL METHODS**

Time: 3 Hours

Max. Marks: 100

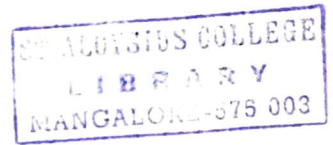
Note: Answer all parts

## PART – A

Answer any **TEN** of the following.

(10×2½=25)

- Find the interval in which a real root of  $x^3 - x - 1 = 0$  lie.
- An approximation value of  $\pi$  is given by 3.1428571 and it's true value is 3.1415926. Find the relative error.
- Compute the value of  $\ln 3$  correct to 5 decimal places.
- Define forward differences.
- Find an expression for  $\Delta^3 y_0$  in terms of  $y_0, y_1, y_2$  and  $y_3$ .
- Write Lagrange's interpolating formula.
- Write the formula for  $\frac{d^2 y}{dx^2}$  for Newton's backward differences.
- What is the condition on the number of subintervals Simpson's  $\frac{1}{3}$  rule to be used?
- What is the bound for the error in trapezoidal rule to evaluate  $\int_a^b f(x) dx$ .
- Find the column norm and row norm of the matrix  $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{bmatrix}$ .
- What is the condition of the system of equations represented by  $AX = B$  is consistent?
- If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 3 & 2 & 1 \end{bmatrix}$ , find Rank of matrix A.
- Write Runge-Kutta fourth order formula.
- For  $n = 0, 1, 2, \dots$  write the modified Euler method.
- Use Picards method to find  $y^{(1)}$  for the equation  $y' = x + y^2$ ,  $y(0) = 1$ ,  $y^{(0)} = 1$ .



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

- Describe the bisection method in finding the real root of the equation  $f(x)=0$ .
- Find a real root of the equation  $f(x)=x^3-2x-5=0$ , correct to 3 decimal places using Iteration method.
- The Equation  $2x = \log_{10} x + 7$  has a root between 3 and 4. Find this root, correct to 3 decimal places by Regula Falsi Method.
- Use the Newton-Raphson Method to find a real root of the equation  $x = e^{-x}$
- Solve by Aitken's  $\Delta^2$  process, the equation  $2x = \cos x + 3$ , correct to 3 decimal places.

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

- Derive Lagrange's formula for interpolation.
- Find the cubic polynomial which takes the following values  
 $y(1) = 24$ ,  $y(3) = 120$ ,  $y(5) = 336$  &  $y(7) = 720$ . Hence obtain the value of  $y(8)$ .
- Find the missing term in the following.

X	0	1	2	3	4
y	1	3	9	-	.81

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

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

- Using divided differences, derive Newton's general interpolation formula.
- Derive Simpson's  $\frac{3}{8}$  rule.
- From the table given below for the values of  $x$  and  $y$ , obtain  $\frac{\partial^2 y}{\partial x^2}$  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

4. Compute the value of  $\int_0^1 \frac{1}{x^2+1} dx$  by Simpson's  $\frac{1}{3}$  rule.
5. Given set of tabulated points  $(1, -3)$ ,  $(3, 9)$ ,  $(4, 30)$  and  $(6, 132)$ , obtain the value of  $y$  when  $x = 2$ , using Newton's divided differences formula.

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

1. Examine the consistency of the equations

$$x - 4y + 5z = 8$$

$$3x + 7y - z = 3$$

$$x + 15y - 11z = -14.$$

2. Solve the system of equations below by Matrix inversion method.

$$2x + 4y + z = 3$$

$$3x + 2y - 2z = -2$$

$$x - y + z = 6.$$

3. Solve by Gauss-Elimination method.

$$3x + 2y + 4z = 7$$

$$2x + y + z = 7$$

$$x + 3y + 5z = 2.$$

4. Solve the system of Equations by the method of successive displacement

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

5. Describe Gauss-seidal method to solve a system of equations.

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

1. Solve  $y' = x + y^2, y(0) = 1$ , using Picard's method of successive approximations.

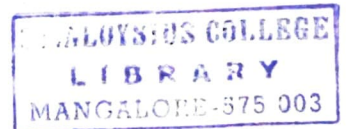
2. Obtain  $y(0.1)$  correct to 4 decimal places for the equation  $\frac{dy}{dx} = xy + 1, y(0) = 1$ , by using Taylor's Series.

3. Use Runge-Kutta method of order 4 to determine  $y(0.1)$  and  $y(0.2)$ , correct to 4 decimal places, given that  $\frac{dy}{dx} = y - x$ , where  $y(0) = 2$ .

4.  $y' = 1 + y^2, y(0) = 0$ , find  $y(0.1), y(0.2)$ , and  $y(0.3)$  take  $h=0.1$  by using modified Euler's method.

5. Describe Adams Bashforth Predictor formula to solve  $\frac{dy}{dx} = f(x, y)$ .

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**St Aloysius College (Autonomous)**  
**Mangaluru**  
**B.Sc. Semester VI – Degree Examination**  
**April 2018**  
**MATHEMATICS – Paper VIII**  
**MATHEMATICAL MODELING**

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

## PART - A

Answer any TEN of the following.

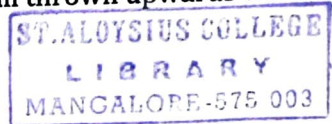
(10×2½=25)

1. Setup suitable equation linking velocity and time for a ball thrown upwards with initial velocity of 32 ft/Sec.
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 100<sup>th</sup> plane.
4. Find the median waiting time 'm' for p=0.1.
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. Determine the optimal order size, if 40 items are sold per day, with carrying cost 0.10 and order cost of 100.
7. When do you say a model is accurate and when do you say robust?
8. Define system error and random error?
9. Suppose a set of measurement of the weight  $x$  of a speck of dust is fit by uniform probability density function

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

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

10. Draw the curves representing  $P(t)$ ,  $S(t)$ ,  $A(t)$ .
11. Give the algorithm for pivot transform.
12. Explain the steps in a simplex algorithm.
13. State travelling salesman problem.
14. Find the first three terms of solution of the difference equation
 
$$x(t+1) - x(t) = \frac{1}{x(t)}, \quad x(0) = 1.$$
15. State Knapsack problem.



G 503.6b(v)

**PART - B****UNIT - I**

(3×5=15)

**Answer any THREE questions.**

1. Build a model to explain manufacturing progress curve with an example.
2. Explain the growth of the population with the help of a model.
3. Find the escape velocity using inverse square law model.
4. Explain steps in building a 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. Construct Controlled Source Seismology model.
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  $\bar{w}$ .

**UNIT - III****Answer any THREE questions.**

(3×5=15)

1. If a straight line  $y = m(x - \bar{x}) + c$  is a best fit for the data  $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ . Find an expression for  $m$ .
2. Find  $R^2$  for the regression equation  $y = 11.302x - 6.319$  for the table

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. The following data is concerned with growth of a plant. Fit a least squares line and use it to predict the height at 4.5 months and at 5 years.

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

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 Eratosthene's model.
2. Maximize  $P = 1000x + 5000y$  over feasible region defined by  $x \geq 0, y \geq 0, 4x + y \leq 10$  and  $18x + 15y \leq 66$ .
3. Maximize  $f(x_1, x_2) = 30x_1 + 50x_2, x_1, x_2 \geq 0$ , subject to  $2x_1 + x_2 \leq 8$  and  $x_1 + 2x_2 \leq 10$ .
4. Using Simplex algorithm, 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. Using Malthus model explain that imprecise model can also be valuable.

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. Find the improvement index of the square (1, 2) (1, 3) and (2,2) in the table.

	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>
S <sub>1</sub>	4 (56)	28	8
S <sub>2</sub>	16 (16)	24 (66)	36
S <sub>3</sub>	28	16 (36)	24 (41)

5. 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  $x(t + 1) \approx 2.5 x(t)$ .

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G 503.6b(vi)

(2014 Batch Onwards)

Reg. No. : 

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**St. Aloysius College (Autonomous)**

**Mangaluru**

**B.Sc. Semester VI – Degree Examination**

**April - 2018**

**MATHEMATICS – Paper VIII**

**DISTRIBUTION THEORY**

**Time: 3 Hours**

**Note: Answer all parts**

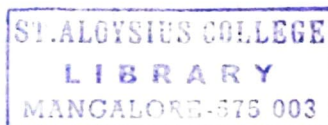
**Max. Marks: 100**

**PART – A**

**Answer any TEN of the following.**

**(10×2½=25)**

1. Show that  $E(X/a) = \frac{1}{a}E(X)$
2. For any Radom Variable X; show that  $P(a \leq X \leq b) = F(b) - F(a)$  where  $F(\cdot)$  is the distribution function of X.
3. Define a Random variable. When it is called Discrete?
4. If  $V(x) = 2.5$ , find  $V(2x + 3.75)$  and  $V(1 - x)$ .
5. Mention any two properties of Bernoulli distribution.
6. For a Binomial Variate with mean 4 and  $p = \frac{1}{2}$  find the S.D.
7. Find  $P(X = 0)$  in a Poisson distribution with mean 5.
8. What is the relationship between Negative Binomial Distribution and Geometric distribution? Explain with an example.
9. A random variable X is distributed uniformly over the interval  $(a, b)$ . State its mean and variance.
10. If X and Y are independent Normal variates find the distribution of  $X + Y$ .
11. Define Beta variate of second kind. State its mean and variance.
12. Find the distribution function of an exponential variable with mean  $\theta$ .
13. What do you mean by Bivariate Normal distribution? Give the p.d.f of the distribution stating its parameters.
14. What do you mean by convergence in distribution? Briefly explain its application.
15. State WLLN for i.i.d random variables and explain its application.



**PART – B**

**UNIT - I**

**Answer any TWO of the following.**

**(2×7½=15)**

1. Define Mathematical Expectation. State and prove addition theorem of expectation.
2. The following is a probability distribution

X:	- 1	0	1	2	3
p(x):	0.05	k - 0.4	k <sup>2</sup>	k	0.1

a) Find the value of k and

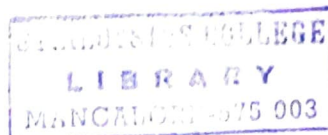
b) find the mean

## 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 iff  $X$  and  $Y$  are uncorrelated. Justify.
2. Two dimensional continuous RV  $(X, Y)$  has a bivariate Normal distribution obtain the marginal distribution of  $X$ .
3. If  $(X, Y)$  has a bivariate Normal distribution obtain the conditional distribution of  $X$  given  $Y = y$ .
4. Deduce MGF of a bivariate Normal Variate and hence obtain its mean and variance.



## UNIT - V

Answer any **TWO** of the following.

(2×7½=15)

1. State and prove Central Limit Theorem.
2.
  - a) A population of community college students includes innercity students ( $p = 0.33$ ). what is the probability that a random sample of 45 students from the population will have from 20% to 40% innercity students?
  - b) A die is rolled 10 times independently. Use CLT to approximate the chance that the sum is between 25 and 45 and also the sum is greater than 45.
3. Define convergence in probability. Give atleast 2 applications and also state any three basic results in convergence in probability.
4.
  - a) Let  $X$  be an exponential variate with parameter  $\theta$ . Using Markov's inequality find an upper bound for  $P(X \geq a)$ . Compare this upperbound with the actual value. (3)
  - b) Examine whether WLLN holds good for the sequence  $\{X_n\}$  of independent random variables where  $P\left[X_n = \frac{1}{\sqrt{n}}\right] = \frac{3}{4}$  and  $P\left[X_n = \frac{1}{\sqrt{n}}\right] = \frac{1}{4}$  (4½)

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St Aloysius College (Autonomous)  
Mangaluru

B.Sc. Semester VI- Degree Examination  
April - 2018

**ELECTRONICS - Paper VII**  
Biomedical Instruments, VLSI and Robotics

Time: 3 Hours

Max. Marks: 100

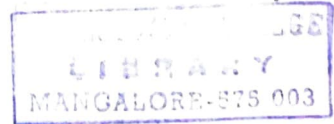
**Note:** This question paper has Three sections. Section - A, Section - B and Section - C. Answer all sections.

## Section - A

## 1. Answer All questions.

(12×1=12)

- i) CLB is the acronym for
  - a) Configurable logic block
  - b) Configurable logic buffer
  - c) Critical logic buffer
  - d) Critical logic block
- ii) Field programmable gate arrays (FPGAs) use \_\_\_\_\_ memory technology, which is \_\_\_\_\_
  - a) DRAM nonvolatile
  - b) SRAM, nonvolatile
  - c) SRAM volatile
  - d) RAM volatile
- iii) In CMOS circuits, which type of power dissipation occurs due to switching of transient current and charging & discharging of load capacitance?
  - a) Static dissipation
  - b) Dynamic dissipation
  - c) Both a) & b)
  - d) none of the above
- iv) What is the important feature of BICMOS?
  - a) low input impedance
  - b) high packing density
  - c) high input impedance
  - d) Bidirectional
- v) Stick diagrams are those which convey layer information through \_\_\_\_\_
  - a) Thickness
  - b) Color
  - c) shapes
  - d) Layers
- vi) Clocked sequential circuits are \_\_\_\_\_
  - a) two phase overlapping clock
  - b) Two phase non-overlapping clock
  - c) Four phase overlapping clock
  - d) Four phase non-overlapping clock
- vii) In piezo-electric strain transducer, voltage is \_\_\_\_\_ to strain applied.
  - a) Directly proportional
  - b) Inversely proportional
  - c) Equal
  - d) Independent
- viii) EEG is related to activities of
  - a) Nerve fibers
  - b) Muscles
  - c) Brain
  - d) Muscles
- ix) \_\_\_\_\_ is the part of biomedical instrumentation system.
  - a) Amplifier
  - b) Transmitter
  - c) Modulator
  - d) Multiplexer.
- x) Process of changing resting potential to action potential is known as
  - a) re-polarisation
  - b) polarisation
  - c) unipolarisation
  - d) depolarisation
- xi) Drives are also known as \_\_\_\_\_
  - a) Actuators
  - b) Controllers
  - c) sensors
  - d) Manipulators
- xii) \_\_\_\_\_ is not the functionality of Robots.
  - a) Reprogrammability
  - b) Multifunctionality
  - c) efficient performance
  - d) responsibility



## 2. Answer any TEN of the following

(10×1=10)

- i) What is meant by Electromyogram?
- ii) What is the magnitude of resting potential of a cell?
- iii) Give one example for temperature sensor.
- iv) What is meant by pneumograph?
- v) Mention one application of LVDT.
- vi) What is dialysis?
- vii) Mention one advantage of VLSI.

Contd...2

- viii) What is meant by psuedo NMOS.
- ix) What type of transistors are used in Pull Down tree in CMOS network.
- x) Name the type of VLSI technology which has maximum electron mobility.
- xi) Define sheet resistance.
- xii) What is meant by position sensors?

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

(10×2=20)

- i) Mention any two differences between active and passive transducers.
- ii) Explain the principle of measurement of blood pressure.
- iii) Mention any two types of ventilators.
- iv) Mention any two requirements of hemodialyser.
- v) Mention any two differences between static and dynamic CMOS logic.
- vi) Draw the topological block diagram of CMOS inverter.
- vii) Draw the labelled diagram of any two types of robot joints.
- viii) Give an example and working of capacitive type of transducer.
- ix) Define Heart-lung machine.
- x) Draw the basic circuit of CMOS inverter.
- xi) Define and give the functioning of Actuators in robotics.
- xii) Give the circuit of two input OR gate using CMOS.

**Section – B**

**4. Answer any SEVEN questions**

(7×4=28)

- i) What are the various static characteristics of Biomedical instruments? Explain.
- ii) What is the significance of measuring ECG? Explain.
- iii) Write a note on the different types of microphones used in hearing aids.
- iv) Explain the two phase clocking techniques in CMOS circuit.
- v) Draw the stick diagram and layout for a CMOS inverter.
- vi) Explain the basic architecture of EPGA.
- vii) Explain "precharge phase" and "Evaluation phase" for a two phase clocked NMOS inverter.
- viii) Design a XOR gate using VLSI design technique.
- ix) With a neat circuit diagram explain the working of an IR sensor.
- x) With a circuit diagram explain a variable resistance (potentiometer) transducer. Also explain its biomedical application.

**Section – C**

**Answer any THREE full questions**

- 5. a) With necessary diagrams explain i) polarisation ii) depolarization (5)  
iii) repolarization of a cell when it is stimulated.
- b) What is a pacemaker? Briefly describe the working principles of an asynchronous pacemaker with a neat sketch. (5)
- 6. a) With the help of a block diagram discuss the working of heart-lung machine. (5)  
b) With necessary diagrams explain the working of an audiometer. (5)
- 7. a) Design a half adder using VLSI design techniques. (5)  
b) Construct CMOS circuit for the evaluation of Boolean expression  $Y = \overline{A} \cdot \overline{B}$  and explain its working. (5)
- 8. a) With a neat diagram explain the working of a rotational encoder. (5)  
b) A particular layer of MOS circuit has a resistivity  $\rho = 1 \text{ ohm.cm}$  A Section of this layer is  $55 \mu\text{m}$  long and  $5 \mu\text{m}$  wide and has a thickness of  $1 \mu\text{m}$ . Calculate the resistance from one end of this section to the others (along the length). What is the value of sheet resistance " $R_s$ "? (5)

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St Aloysius College (Autonomous)  
Mangaluru

B.Sc. Semester VI- Degree Examination  
April - 2018

**ELECTRONICS - Paper VIII**  
**8086 MICROPROCESSOR & C LANGUAGE**

Time: 3 Hours

Note: This question paper has Three sections. Section - A, Section - B and Section - C. Answer all sections. Max. Marks: 100

## Section - A

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

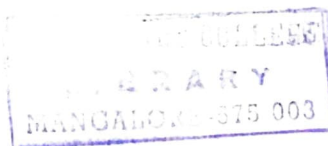
(12×1=12)

- i) 8086  $\mu P$  has \_\_\_\_\_ bit PSW register  
a) 4                      b) 16                      c) 8                      d) 20
- ii) \_\_\_\_\_ Instruction is used for table translation in 8086  $\mu P$ .  
a) XLAT                  b) STOSB                  c) MOVSB                  d) REP
- iii) Maximum mode system means \_\_\_\_\_  
a) system with single processor                  b) system with no processor  
c) system with Multi processor                  d) system with microcontroller
- iv) \_\_\_\_\_ interrupt in 8086  $\mu P$  is non maskable.  
a) INT 00h                  b) INT 01h                  c) INT 02h                  d) INT 03h
- v) In 8086  $\mu P$  stack pointer is \_\_\_\_\_ bit  
a) 20                  b) 16                  c) 8                  d) 32
- vi) REP instruction repeats until  
a) AX=0                  b) BX =0                  c) CX=0                  d) CX  $\neq$  0
- vii) \_\_\_\_\_ is not a string constant in C language  
a) "ABC"                  b) "123"                  c) 123                  d) "hi"
- viii) Default initial value of static storage class in C is \_\_\_\_\_  
a) 0                  b) garbage value                  c) 500                  d) 10
- ix) The C statement a+=b is equal to  
a) a=a+b                  b) b=a+b                  c) a=a+a                  d) b=b+b
- x) If a[10] = {100}; then value of a[15] is \_\_\_\_\_  
a) 100                  b) 0                  c) garbage value                  d) wrong statement
- xi) Which of the following is not a key word in C language.  
a) int                  b) alpha                  c) void                  d) auto
- xii) \_\_\_\_\_ is invalid in C language  
a) while (x=5)                  b) for (i=10; i<10; i--)                  c) a=b+c                  d) switch (k)

2. Answer any TEN of the following

(10×1=10)

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



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

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

- i) Mention the role of AX register in 8086  $\mu P$ .
- ii) Explain 'DW' directive of 8086  $\mu P$ .
- iii) Calculate physical addresses using the addresses [DS]=1500h [CS] =1300h [IP]=2000h and [BX]=78FEh
- iv) Write any two differences between Procedures and Macros.
- v) Write a 8086 program to divide two 8-bit numbers.
- vi) Mention the role of index register during string manipulation in 8086  $\mu P$ .
- vii) Given a=2, b=20, C=5, d=30. Evaluate the following, C expressions.
  - a) (a>b) && (c<30)      b) (a<b) || (d>c)
- viii) Mention the different methods to input a character from the keyboard in 'C'
- ix) How does user defined function differ from library function?
- x) Mention the differences between gets() and scanf() function.
- xi) Explain strcpy() function in 'C'.
- xii) Mention different storage classes available in 'C' .

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

- i) With bit pattern explain PSW register of 8086  $\mu P$
- ii) Write a 8086 program to multiply two eight bit number.
- iii) With syntax and example explain the following 8086 directives.
  - i) DD    ii) LENGTH
- iv) With example explain how stack is used while calling the procedure in 8086  $\mu P$ .
- v) Write a note on programmed I/O techniques.
- vi) Write a C program to compare two strings.
- vii) Write a C function to multiply two numbers read from key board.
- viii) Write a note on arrays in C.
- ix) With example explain the logical operators used in 'C'.
- x) Write a 'C' program to find the area of a circle by reading radius from the keyboard.

**Section - C****Answer any THREE full questions**

- 5. a) Explain General purpose registers and segment registers used in 8086  $\mu P$ . **(5)**
- b) With example explain switch statement used in C **(5)**
- 6. a) With necessary diagram explain the minimum mode architecture of 8086  $\mu P$ . **(5)**
- b) Write a 'C' program to sort an array in ascending order using bubble sort. **(5)**
- 7. a) Explain the interrupt I/O used in 8086  $\mu P$ . **(5)**
- b) With example explain do- while loop in C. **(5)**
- 8. a) With syntax and example explain following 8086 instructions. **(5)**
  - i) MOVSB    ii) SCASB **(5)**
- b) With example explain arithmetic operators available in C. **(5)**

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G505.6a

(2015 Batch onwards)

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

**B.Sc. Semester VI – Degree Examination**  
**April - 2018**

**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)

- What is the purpose of IP and SP register?
- Define intra-segment Jump.
- Write the functions of NMI pin of 8086.
- What is the significance of instruction XOR CX, CX?
- What is an assembler?
- Which register is used in looping?
- Differentiate between maskable and non-maskable interrupts.
- How do you define global variables?
- Define preprocessor.
- Write any two software interrupt instructions.
- Define a bus cycle. How it is related to T-state?
- Name any two instructions used to control the carry flag bit.

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

- Define variables and constants.
- Explain briefly NOP and HLT instructions.
- Explain the ASSUME directive of 8086.
- Write the purpose of PUSHF and POPF instructions.
- Write any two data transfer instructions and give an example to each.
- Explain DIV CL instruction with an example.

**PART – B****Answer any ONE full question from each unit.** (4X20=80)**Unit I**

- Explain the different types of 8086 instructions based on the number of operands. (8)
  - Explain the following assembler directives with syntax and example. (8)
    - ORG
    - LABEL
    - PUBLIC
    - DW
  - Write a note on the following development tools – (4)
    - Editor
    - Debugger
- Explain the internal architecture of 8086 with neat block diagram. (8)
  - Draw the structure of PSW. Explain any four conditional flags. (6)
  - Explain the procedure definition directive and macro definition directives with examples. (6)

Contd...2



**Unit II**

5. a) With syntax and example, explain the following instructions -  
 i) ROL      ii) RCL      iii) SHR      iv) ROR      (8)
- b) Explain the purpose of DAS instruction with an example.      (6)
- c) Explain any four processor control instructions.      (6)
6. a) What is a REP Prefix? How it is used in string manipulation instructions?  
 Explain with an example.      (8)
- b) Write a note on logical instructions.      (6)
- c) Explain the use of SCAS, STOS and LODS primitives.      (6)

**Unit III**

7. a) Explain any four combine types used in combining segments in different  
 object modules. Give an example.      (8)
- b) What is a stack? Explain the stack related instructions of 8086.      (6)
- c) What are nested macros? Explain with example.      (6)
8. a) Explain the concept of saving and restoring registers with neat diagram.      (7)
- b) Explain any two methods of passing parameter to a procedure.      (5)
- c) Explain the DOS and BIOS level of I/O programming.      (4)
- d) Write an ALP to find length of entered string.      (4)

**Unit IV**

9. a) Write the steps involved in 8086 program development process. Give  
 an example.      (7)
- b) Explain intdos and intdosx functions with syntax and example.      (6)
- c) Explain the interrupt I/O with neat diagram.      (4)
- d) Write a note on single step interrupt.      (3)
10. a) Write a note on how an interrupt works in an 8086 processor. Explain  
 the use of interrupt vector table.      (8)
- b) Explain the method of transferring data through programmed I/O.      (8)
- c) Explain the interrupt INT 02H with an example.      (4)

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(2015 Batch onwards)

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**St Aloysius College (Autonomous)**  
**Mangaluru**  
**B.Sc. Semester VI – Degree Examination**  
**April - 2018**  
**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)

- List any two functions of the browser.
- What is the use of the COLSPAN and ROWSPAN attribute?
- Explain background and text attributes of the <body> tag.
- How do you incorporate comments within or PHP script?
- Which are the four components of the LAMP framework?
- What are the rules for naming variables in PHP?
- Explain any two PHP functions to test variable data types.
- Give an example for assigning values to an array.
- What is database normalization?
- List any two categories of PHP error.
- What is a cookie?
- List any two ways to maintain state for a website.

**PART – B**Answer any **ONE** full question from each unit.

(4x20=80)

**Unit I**

- What is the use of <marquee> tag? Explain the attributes of the <marquee> tag with example. (7)
  - Explain any <A> tag with its attributes. (5)
  - What are the uses of <option> and <frame> tag? (5)
  - Explain the difference between GET and POST method. (3)
- Write a note on –
    - Web Sever
    - Web Browser
  - Explain any three style sheet properties. (6)
  - Explain the inline style attributes. (4)
  - Explain any two types of lists in HTML. (4)

**Unit II**

- Explain the switch statement with the help of an example. (5)
  - Explain any five string functions with examples. (5)
  - With examples explain the different types of if statements. (10)
- Write a note on combining loops. (5)
  - Explain any five numeric functions with examples. (5)

Contd...2

**G505.6b(1)**

- c) Given the string 'Jane had a nice day', create the new string 'Jane had Pizza'. (5)
- d) Explain the ternary operator with syntax and example. (5)

**Unit III**

6. a) Explain any five array functions with examples. (10)
- b) Write the code to create a web application that lets you enter your date of birth and calculate your age in years and months. (7)
- c) Explain any three My SQL data types. (3)
7. a) How do you define a user-defined function in PHP with variable length argument list? Explain with example. (8)
- b) What are the two types of PHP arrays? How do they differ? (6)
- c) Write a program that reads an array and returns a message indicating whether the array contains only unique values. (6)

**Unit IV**

8. a) How to secure database access? Explain. (6)
- b) Explain different cookie attributes. (5)
- c) Explain any five PHP functions used to validate user-input. (5)
- d) Explain the benefits offered by the PHP exception based model. (4)
9. a) Explain the following SQL commands with example. (8)
- i) CREATE ii) SELECT iii) DROP iv) INSERT
- b) Explain the PHP functions to create, register and erase sessions. (6)
- c) List some of the security features of cookies. (6)

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(2007-2015 Batch)

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

**B.Sc. Semester VI – Degree Examination**  
**April - 2018**

**STATISTICS – Paper VII**  
**SAMPLING THEORY**

Time: 3 hrs.

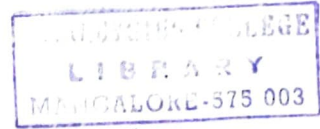
Max Marks: 100

Note: Answer all parts

**PART – A**Answer any **TWELVE** of the following.

(2×12=24)

1. Define Census and Sample Survey.
2. Define SRSWR with an example.
3. Explain Pilot Survey.
4. What are non sampling errors?
5. Show that  $E(\bar{y}) = \bar{Y}$  under SRSWR.
6. Prove that SRSWOR is more precise than SRSWR.
7. What is the need of Stratification?
8. What do you mean by sampling of attributes?
9. What do you mean by finite population correction?
10. State any two advantages of systematic sampling.
11. Write all possible systematic samples of size 4 from a population consisting of 20 units  $y_1, y_2, y_3 \dots, y_{20}$ .
12. Under systematic sampling with usual notations, prove that  $E(\bar{y}_{sys}) = \bar{Y}$
13. What do you mean by Cluster sampling?
14. What are different sources of sampling errors?
15. With usual notations, prove that  $E(p) = P$ .

**PART – B**Answer any **SIX** of the following.

(6×6=36)

16. Discuss the basic principles of Sample Survey.
17. Explain the method of drawing simple random sample from a contingency table.
18. Under SRSWR, prove that sample mean square is an unbiased estimator of  $\sigma^2$ .
19. With usual notations, show that  $V(\bar{y})_{SRSWOR} = \frac{N-n}{Nn} S^2$

20. Derive the expression for variance of an unbiased estimator of population mean under stratified random sampling.
21. Explain stratified random sampling. What are its advantages over SRS?
22. Show that in a stratified random sampling, the variance of the estimated mean is minimum for a fixed cost, with the cost function  $C = C_o + \sum C_h n_h$  when  $n_h \propto N_h S_h$ .
23. With usual notations, prove that systematic sampling is more efficient than SRS if  $S_{WSY}^2 > S^2$ .
24. With usual notations prove that  $V(a) = \frac{N^2(N-n)}{N-1} \frac{PQ}{n}$ .

**PART - C**

Answer any **FOUR** of the following.

(10×4=40)

25. a) What are the uses of sampling? (5)
- b) Prove that under SRSWR the variance of the unbiased estimator of the population mean is  $\frac{\sigma^2}{n}$ . (5)
26. Show that under SRSWOR sample mean square is an unbiased estimator of population mean square.
27. Derive the formula for  $V(\bar{y}_{st})$  and modify it under Neyman allocation.
28. Under certain conditions to be stated, with usual notations show that  $V(\bar{y})_{SRSWOR} \geq V(\bar{y}_{st})_{prop} \geq V(\bar{y}_{st})_{opt}$
29. a) Show that with usual notations  $V(\bar{y})_{sys} = \frac{S^2}{n} \frac{N-1}{N} (1 + (n-1)\rho)$   
Where  $\rho$  is the intra-class correlation coefficient between the units of the same systematic sample. (8)
- b) Under Simple random sampling for attributes, show that sample proportion is an unbiased estimator of population proportion. (2)
30. a) Under certain conditions, prove that  $V(\bar{y})_{sys} \leq V(\bar{y})_{SRSWOR}$  (6)
- b) Derive an expression for the variance of the estimated population mean under cluster sampling with equal number of units. (4)

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(2007 – 2015 Batch)

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Reg. No:

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**St. Aloysius College (Autonomous)**  
**Mangaluru**  
**B.Sc. Semester VI – Degree Examination**  
**April - 2018**  
**STATISTICS – Paper VIII**  
**OPERATIONS RESEARCH**

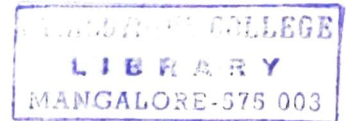
Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

**PART – A****I Answer any TWELVE of the following. (2×12=24)**

- a) State any two definitions of operations Research.
- b) Define i) Basic Feasible solution    ii) Optimal solution with reference to LPP.
- c) State any two advantages of dual LPP.
- d) Briefly explain north west corner rule of finding IBFS of transportation problem.
- e) Show that AP is a special case of TP.
- f) Write the mathematical model of transportation problem.
- g) Give one real life example for assignment problem.
- h) How many basic solutions you can have with the system of linear equations.  
 $2x_1 - x_2 + x_3 = 8$     and  $4x_1 + 3x_2 + x_4 = 12$
- i) What is unbalanced transportation problem? How do you modify it to find optimal solution?
- j) Given the simplex tableau, what is the criterion for the existence of unbounded solution?
- k) State any two characteristics of a game.
  - l) What do you mean by earliest finishing time and latest starting time.
- m) What do you mean by zero sum two person game? Give a suitable example.
- n) Distinguish between total float and independent float with reference to project network.
- o) Explain shortage cost & holding cost in an inventory theory.

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

2. Explain various models used in OR.
3. Write down the dual of the following LPP.

$$\text{Max } Z = 2x_1 + 3x_2 + x_3$$

$$\text{s.t } x_1 - 2x_2 + x_3 \leq 5$$

$$2x_1 + x_2 + 2x_3 \geq 8$$

$$x_1 - 4x_2 + 3x_3 = 4$$

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

Contd...2

4. What do you mean by Inventory control? What are the advantages of maintaining inventory in a firm?
5. Explain the graphical method of solving a game.
6. Briefly explain duality theory and its application.
7. Find the Basic solutions for the system of equations
 
$$4x_1 + 2x_2 + 5x_3 - x_4 = 6$$

$$6x_1 + x_2 + 3x_3 + 8x_4 = 5$$
8. What is a project? Define a dummy arrow used in a network. Give two purposes for which it is used.
9. How do you find Initial basic feasible solution to a transportation problem using Vogel's approximation method?
10. Explain dominance principle of reducing the size of the two person zero sum game.

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

11. a) Briefly explain the graphical method of obtaining an optimal solution to a given LPP. (5)  
 b) Briefly explain the nature of OR. (5)
12. a) Show that transportation problem is a special case of LPP. (4)  
 b) State and prove necessary and sufficient condition for the existence of a feasible solution to a transportation problem. (6)
13. a) Show that in an AP the optimal assignment remains unchanged when we subtract a constant from each element in a row. (5)  
 b) Briefly explain Hungarian method of solving an assignment problem. (5)
14. Derive an expression for the EOQ with uniform demand instantaneous production where shortages not allowed. (10)
15. a) Derive the criterion for solving a newspaper boy problem. (5)  
 b) Explain algebraic method of solving a zero sum two person game with no saddle point. (5)
16. a) Explain the following terms in PERT (5)
 

i) optimistic time	ii) normal time	iii) pessimistic time
iv) expected time	v) variance in relation to activities	
- b) What do you mean by Flukerson's I-J rule? Explain different types of activities and events in network diagram representation. (5)

G 507.6a

(2014 batch onwards)

Reg. No.

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

B.Sc. Semester VI – Degree Examination

April – 2018

**BOTANY – PAPER VII**  
**Plant physiology**

Time: 3 hrs.

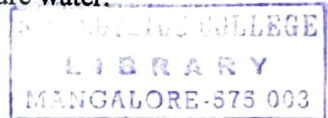
Max Marks: 100

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

**SECTION - A**

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

1. Define water potential. Give the water potential of pure water.
2. Name any four antitranspirants.
3. What is field capacity? Mention its significance.
4. List any two symptoms of magnesium deficiency in plants.
5. What is photorespiration? Give its significance.
6. Give two differences between C<sub>3</sub> and C<sub>4</sub> plants.
7. What is malate shuttle?
8. What is absorption spectrum?
9. Give any two physiological role of abscissic acid.
10. Define nastic movement with an example.
11. Differentiate between quiescent and dormant seeds.
12. What is vernalization? Mention its significance.

**SECTION – B**

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

1. Explain starch sugar interconversion theory of transpiration.
2. Give an account root pressure theory of ascent of sap.
3. Explain Munch's mass flow hypothesis, add a note on its advantages and disadvantages.
4. Write a note on chemosynthetic bacteria.
5. Give an account of factors affecting photosynthesis.
6. Define fermentation. Explain its types.
7. Describe the different methods adopted to measure the linear growth of plants.
8. Write a note on growth inhibiting hormones.
9. Describe the methods to breaking seed dormancy.



SECTION - C

**III** Answer any FIVE of the following.

(5×10=50)

1. Explain the role of any three minor elements in plants growth.
2. Explain active and passive absorption of water by plants.
3. Write short note on
  - a) Hydathode and its importance
  - b) Plasmolysis and its practical application.
4. Give an account of Glycolysis and E.T.S.
5. Give an account on Calvin cycle.
6. Give an account on photophosphorylation and its significance.
7. Explain the role of auxins in plants. Write a note on natural and synthetic auxins.
8. Write short note on
  - a) Photoperiodic induction      b) phytochrome
  - c) Gibberellins and flowering response      d) short day plants
9. Give an account of different tropic movements in plants with illustrations.

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G 507.6b

(2014 batch onwards)

Reg. No.

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

**B.Sc. Semester VI – Degree Examination**  
**April – 2018**

**BOTANY – PAPER VIII**

**MOLECULAR BIOLOGY II, BIOTECHNOLOGY, PLANT PROPAGATION AND PHARMACOGNOSY**

Time: 3 hrs.

Max Marks: 100

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

**SECTION - A**

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

1. What is RNA editing? Mention its significance.
2. What is totipotency? Write its importance.
3. What are biosafety regulations?
4. What are the differences between ex vivo and in vivo gene therapy.
5. Write the working principle of Soxhlet extraction.
6. Write the importance of citric acid pathway.
7. Give the organoleptic evaluation of any flower bud crude drug.
8. Distinguish between organized and unorganized crude drugs.
9. What is unani system?
10. What are tannins? Mention their uses.
11. Write any two therapeutic properties of glycosides.
12. Give the scientific name, family, use of any one of the crude drug containing resin.



**SECTION – B**

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

1. Write a note on transposons.
2. Comment on scope of pharmacognosy.
3. Write a note on protoplast culture.
4. What is surface sterilization? Explain the technique.
5. Write a note on any two carbohydrate based crude drugs.
6. Give the schematic representation of Mevalonic acid pathway.
7. Explain homeopathy system of medicine.
8. Write a note on types of adulterants with examples.
9. What are flavanoides? Explain any two crude drugs.

Contd...2

SECTION – C

**III** Answer any FIVE of the following.

(5×10=50)

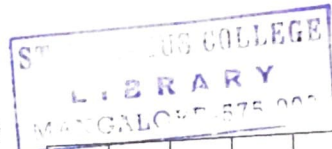
1. What are transgenic plants? Explain the production of any one of the transgenic plant.
2. Give an account on gene regulation in prokaryotes.
3. Explain a) Somaclonal variations                      b) Bioremediation
4. Explain the types of artificial methods of cultivation of medicinal plants.
5. Give an account on microscopical evaluation of any one of the crude leaf drugs.
6. Describe shikmic acid pathway with its significance.
7. Explain the principle, procedure and applications of TLC.
8. Describe Pentose phosphate pathway with a note on its significance.
9. Explain the source, physicochemical and therapeutic properties of terpenoides and steroids.

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(2014 Batch Onwards)

Reg. No.:



59

**St Aloysius College (Autonomous)**  
**Mangaluru**  
**B.Sc. Semester VI – Degree Examination**  
**April - 2018**  
**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.**

- What are secondary lymphoid organs? Give two examples.
- Give two examples for viral vaccines.
- Write the differences between innate and acquired immunity.
- Write any two viral parasitic diseases? Name the causative agents.
- Write a note on trophic form of *Entamoeba*.
- What are the different modes of transmission of typhoid?
- Define chronic toxicity.
- What is sericulture? Name any two species of silk worm used in sericulture.
- Name the indigenous cattle varieties.
- Give the scientific name of any two species of honey bees.
- What are broilers? Give two examples.
- What is vermiwash? Write its uses.

**PART – B**

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

**Unit I**

- II a)** Give a detailed account on cells of immune system. (10)  
**b)** Enumerate the functions of IgG. (5)  
**c)** Write a note on arthritis. (5)

**OR**

- III a)** Give an account of mode of transmission, effects and preventive measures of AIDS. (10)  
**b)** Explain the role of thymus as primary lymphoid organ. (5)  
**c)** Give a brief account on antibody diversity. (5)

**Unit II**

- IV a)** With neat labeled diagrams, explain the life cycle of *Ascaris*. (10)  
**b)** Write a note on diarrhea. (5)  
**c)** Explain briefly the pathogenecity of *Giardia*. (5)

**OR**

Contd...2

- V a) Write explanatory note on – i) elephantiasis (10)  
ii) vectors of parasitic diseases (5)
- b) Discuss the control measures of malaria. (5)
- c) Explain the mode of infection and transmission of *Ancylostoma*. (5)

**Unit III**

- VI a) Give an account on factors affecting toxicity. (10)
- b) Write a note on exotic breeds of cattle. (5)
- c) Explain briefly the diseases of silkworm. (5)

**OR**

- VII a) Give a detailed account on fish diseases. Add a note on their control measures. (10)
- b) Explain bioaccumulation with relevant examples. (5)
- c) Write a note on milk and its byproducts. (5)

**Unit IV**

- VIII a) Explain the morphology and life cycle of honey bees. (10)
- b) Write the ecological classification of earthworms with an example. (5)
- c) Explain housing management of poultry. (5)

**OR**

- IX a) Give an account of preparation of vermincompost. Add a note on applications of vermicompost. (10)
- b) What are the economic importance of poultry? (5)
- c) Write a note on bee keeping and management. (5)

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G508.6b

(2014 Batch Onwards)

Reg. No.:

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**St Aloysius College (Autonomous)**  
**Mangaluru**  
**B.Sc. Semester VI – Degree Examination**  
**April - 2018**  
**ZOOLOGY – Paper VIII**  
**Ethology, Evolution and Palaeontology**

Time: 3 Hours.

Max Marks: 100

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

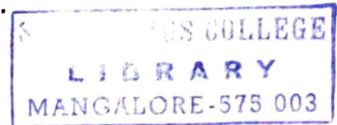
ii) Draw diagrams wherever necessary.

**PART – A**

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

(10X2=20)

- a) What is instinct behaviour? Give an example.
- b) Mention the different types of individuals in a termite colony.
- c) Write the significance of communication.
- d) What is catadromous migration? Give an example.
- e) Explain parental care in *Arius*.
- f) What is monogamy? Give an example.
- g) Define cosmozoic theory.
- h) Explain genetic drift.
- i) Define vestigial organ. Give an example.
- j) What is macro evolution?
- k) Write a note on *stegosaurus*.
- l) Explain trace fossils.



**PART – B**

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

**Unit I**

- II a)** Explain different types of learnt behaviour. (10)  
 b) Write short note on territorial behaviour. (5)  
 c) What are the components of communication? Explain. (5)

**OR**

- III a)** Explain social organization in monkey troops. (10)  
 b) Write a note on aggressive behaviour. (5)  
 c) Explain biological clock. (5)

**Unit II**

- IV a)** Explain the methods of studying bird migration. (10)  
 b) Give a detailed account on courtship in frogs. (5)  
 c) Write a note on reproductive strategies. (5)

**OR**

- V a)** Explain nesting in birds. (10)  
 b) Write a brief note on polyandry. (5)  
 c) With reference to migration, explain orientation and navigation. (5)

Contd...2

**Unit III**

- VI** a) Give an account on morphological evidences for organic evolution. (10)  
b) Explain Hardy-Weinberg equilibrium. (5)  
c) With reference to origin of life explain precambian rocks. (5)

**OR**

- VII** a) With reference to organic evolution, explain principles of Lamarckism. (10)  
b) Give an account of evidences of organic evolution from embryology. (5)  
c) Explain the theory of chemical evolution. (5)

**Unit IV**

- VIII** a) Explain the methods of preservation of fossils. (10)  
b) Give an account of *Archaeopteryx*. (5)  
c) Explain causative factors for the extinction of species. (5)

**OR**

- IX** a) Illustrate extinction linked to species characteristics. (10)  
b) Write notes on Cromagnon man. (5)  
c) Explain sympatric speciation. (5)

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(2014 Batch onwards)

G 509.6a

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

**B.Sc. Semester VI- Degree Examination**  
**April 2018**

**MICROBIOLOGY – Paper VII**

**Principle of Bacterial Genetics, Genetic Engineering and Bioinformatics**  
**Time: 3 Hours**

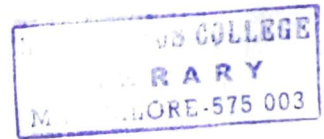
**Max. Marks:100**

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

**PART – A**

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

- a) Composite transposons
- b) Initiation codon
- c) Helicase
- d) Base analogues
- e) Hfr conjugation
- f) Adaptors
- g) GM foods
- h) PCR
- i) Cosmid vector
- j) Sequence alignment
- k) Metagenomics
- l) Operon



**PART B**

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

**(15×4=60)**

**UNIT – I**

2. a) Explain the mechanism of replication of DNA and Add a note on enzymes involved in replication.

**OR**

2. b) Explain the gene regulation in bacterial cells with reference to Lac Operon. **(9)**
2. c) Write briefly on characteristics of genetic code. **(6)**

**UNIT – II**

3. a) Explain the mechanism of conjugation in prokaryotes.

**OR**

3. b) Explain the methods of gene transfer by transduction in prokaryotes. **(9)**
3. c) Write briefly on DNA repair mechanism by nucleotide excision. **(6)**



**UNIT – III**

4. a) Explain the method of production of insulin by genetic engineering.

**OR**

4. b) Explain thin layer chromatograph. (9)

4. c) Write a short note on Southern blotting. (6)

**UNIT – IV**

5. a) Explain in detail bioinformatic databases.

**OR**

5. b) Explain about sequence similarity search tools. (9)

5. c) Write briefly on prokaryotic ORF. (6)

**PART – C**

**Answer any FOUR of the following:**

**(5x4=20)**

6. a) Mutation by radiations

b) Types of Plasmids

c) Transformation

d) Blue white screening

e) Biosafety and Bioterrorism

f) History of Bioinformatics

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**St Aloysius College (Autonomous)**

**Mangaluru**

**B.Sc. - Semester VI - Degree Examination**

**April - 2018**

**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)

- Oxidation-reduction potential ( $E_H$ ).
- Cold storage
- Solid state fermentation
- Baker's yeast
- Pasteurization temperature
- Rota virus
- DMC
- Strain improvement
- SCP
- Radappertization
- HOPS
- Types of vinegar



**PART - B**

**Answer '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 preservation of food using chemical preservatives. (9)

2. c) Briefly write on the sources of food contamination. (6)

**UNIT - II**

3. a) Explain the food borne infections.

**OR**

3. b) Explain the microbial examination of surfaces. (9)

3. c) Write a short note on mycotoxins. (6)

**Contd...2**

**UNIT - III**

4. a) Explain the components and design of a fermentor.

**OR**

4. b) Explain the production of beer in industry. (9)

4. c) Write a short note-inoculum development. (6)

**UNIT - IV**

5. a) Explain the process of penicillin production.

**OR**

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

5. c) Explain the production of baker's yeast. (6)

**PART - C**

**Answer any FOUR of the following.**

**(5x4=20)**

- 6. a) Radiations in food preservation
- b) Spoilage of food by thermophilic spore forming bacteria.
- c) Dye reduction test
- d) Screening of microorganisms for new products
- e) Acidity in wine
- f) Foam control in fermentation

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G 510.6a

(2013 batch onwards)

Reg. No:

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**St Aloysius College (Autonomous)  
Mangaluru**

**B.Sc. Semester VI- Degree Examination**

**April- 2018**

**BIOCHEMISTRY - Paper VII**

**Microbiology, Immunology and Endocrinology**

**Time: 3 Hours**

**Max. Marks: 100**

**Instructions:**

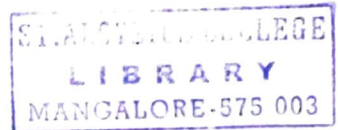
1. Write the question number and subdivision clearly
2. Write equations and diagrams wherever necessary
3. Answer Part - A in the first two pages of the answer book

**PART - A**

**Answer any TEN of the following.**

**(10×2=20)**

1. a) What are monoclonal Antibodies?
- b) Write the principle and applications of ELISA.
- c) What are stem cells? Mention their clinical use.
- d) Name the hormones and their functions produced by pituitary gland.
- e) What are endospores? Give an example of organism producing endospores.
- f) What are bacteriophages? Give an example.
- g) Mention the immunological role of bone marrows.
- h) Name the regents used in Gram's staining technique.
- i) What is culture media? Give an example.
- j) What are secondary messengers? Mention the role of cAMP.
- k) What are Haptens?
- l) Differentiate between Antigenicity and Immunogenicity.



**PART - B**

**Answer any SIX of the following**

**(6×5=30)**

2. Write a note on morphology of TMV.
3. Write a note on AIDS.
4. Name one function of the following hormones:  
i) Insulin ii) FSH iii) Adrenaline iv) Testosterone v) Growth hormone
5. Mention the contributions of Robert Koch and Louis Pasteur in the field of Microbiology.
6. Explain the types of Transplants. Give example for Immunosuppressive agents used in clinical situation.
7. Explain Serial dilution method for isolation of pure microbial culture.
8. Mention the types of T-lymphocytes and explain their functions.
9. Explain the structure of Antibody.

**PART - C**

**Answer any FIVE of the following**

**(5×10=50)**

10. Explain briefly Autoimmune disorders.
11. What are Immunoglobulins? Give their types and functions of each.
12. Explain i) Acid fast staining ii) Graft rejection
13. Explain various phases of microbial growth curve. Describe the factors influencing it.
14. What is sterilization? Explain the chemical methods of sterilization.
15. Explain the functions and general mechanism of steroid and peptide hormone action.
16. Explain: i) type I hypersensitivity ii) Principle and applications of RIA.

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**St Aloysius College (Autonomous)**  
**Mangaluru**  
**B.Sc. Semester VI- Degree Examination**  
**April- 2018**

**BIOCHEMISTRY - Paper VIII**  
**Clinical and Membrane Biochemistry**

Time: 3 Hours

Max. Marks: 100

Instructions:

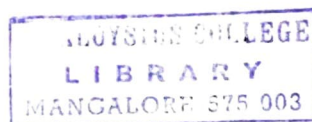
1. Write the question number and subdivision clearly
2. Write equations and diagrams wherever necessary
3. Answer Part - A in the first two pages of the answer book

**PART - A**

Answer any TEN of the following.

(10×2=20)

1. a) Mention the normal urine-volume, pH and specific gravity.
- b) What is FBS and RBS? Write the difference between them.
- c) Differentiate between Serum and Plasma.
- d) What is pancreatitis?
- e) Write the difference between SGPT and SGOT.
- f) Which are the causing factors for Haemophilia? Mention its symptoms.
- g) What are ionophores?
- h) What is active transport?
- i) What is radio active decay?
- j) Define curie and Rad.
- k) Mention any drugs and enzymes used in cancer treatments.
- l) Differentiate between benign and malignant tumors.

**PART - B**

Answer any SIX of the following

(6×5=30)

2. Write the clinical significance of urea, uric acid and creatinine.
3. What are Lipoproteins? Write the difference between LDL & HDL.
4. Discuss the significance of LDH.
5. Explain the functions of plasma membrane.
6. Write about usage of radio activity in medicine.
7. Explain the mechanism of free radical generation.
8. What are tumor markers? Explain its characteristics.
9. Write a note on Niemann- Pick disease.

**PART - C**

Answer any FIVE of the following

(5×10=50)

10. a) Write the variation in pathological condition of Diabetes mellitus. (5)
- b) Write about abnormal constituents of urine and its clinical significance. (5)
11. Explain the isolation, characterization and classification of membranes. Add a note on chemistry of membrane.
12. a) Explain fluid mosaic membrane model. (5)
- b) Explain the mechanism of phagocytosis. (5)
13. a) What is radiation hazard? Which are the safety measures to be taken for it. (5)
- b) How free radicals can be detected? Mention its uses. (5)
14. Give an account on Scintillation counter.
15. Explain properties of cancer cells and its characteristics. Add a note on mechanism of carcinogenesis.
16. a) Explain any two membrane transport system. (5)
- b) Write a note on acid and alkaline phosphatase. (5)

(2014 Batch onwards)

G 511.6a

Reg. No.

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

**B.Sc. Semester VI – Degree Examination**  
**April - 2018**

**BIOTECHNOLOGY-Paper VII**  
**Environmental Biotechnology**

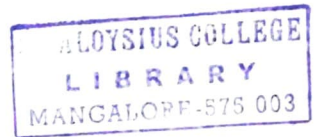
Time: 3 hrs.

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 commensalism with a suitable example.
- b) Define "Nitrification". Give two examples for organisms involved in the process.
- c) What is allergen? Give an example.
- d) Mention the causative agents of Giardiasis and Amoebiasis.
- e) What is CRZ? Mention any two features of CRZ-1.
- f) List any two properties of *Azospirillum*.
- g) Define BOD.
- h) What is land filling?
- i) List any two disadvantages of biopesticide.
- j) What is bioleaching? Mention its advantages.
- k) Give two example for phosphate solubilising microorganisms.
- l) What is gasohol?

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

2. Explain sulphur cycle in detail.
3. Explain any two types of air sampling techniques.
4. Write short notes on soil pollution.
5. Explain the technique of solids processing.
6. Describe the tertiary treatment of waste water.
7. Give an account on qualitative analysis of waste water.
8. Explain the steps involved in biogas production. Draw a labeled diagram of biogas plant.
9. What are energy gardens? Explain with a suitable example.
10. Explain the steps involved in the production of Rhizobial biofertilizer.

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

11. Explain Carbon cycle in detail.
12. Give a detailed account on negative microbial interactions.
13. Explain any four methods involved in secondary treatment of waste water.
14. Give a detailed account on mechanism and types of leaching. Add a note on factors affecting leaching.
15. Give an account on renewable and nonrenewable energy sources.
16. Explain *Baculoviruses* as biopesticides.

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G 511.6b

(2014 batch onwards)

Reg. No.

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

**B.Sc. Semester VI – Degree Examination**

**April – 2018**

**BIOTECHNOLOGY – Paper VIII**  
**BIOPROCESS TECHNOLOGY**

**Time: 3 hrs.**

**Max Marks: 100**

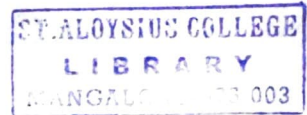
- Note: i) Answer all the questions**  
**ii) Draw diagrams wherever necessary**

**PART - A**

**Answer any TEN of the following.**

**(10×2=20)**

- 1.a) Define Abzymes and give one use.
- b) Write two applications of enzymes in textile industry.
- c) Give two factors affecting spoilage of food.
- d) What is ultra filtration?
- e) Write types of fermentations.
- f) Expand SGPT. Give one chemical significance.
- g) Give advantage of bioprocess over chemical process.
- h) What is batch fermentation?
- i) Give examples for microbial flora of fruits and vegetables.
- j) Define biosensors.
- k) Give test for pasteurized milk.
- l) What are probiotics?



**PART - B**

**Answer any SIX of the following.**

**(6×5=30)**

2. Explain basic design of a fermenter.
3. Give an account on primary screening of organism for producing metabolites.
4. Write short notes on botulism.
5. Explain applications of enzymes in therapeutics.
6. Explain immobilized enzyme techniques.
7. Comment on prebiotics.
8. Explain mushroom culture and give two examples of edible mushroom.

**Contd...2**

9. Explain carbon and Nitrogen source in media preparation.
10. Give an account on gel filtration chromatography.

**PART - C**

Answer any **FIVE** of the following.

(5×10=50)

11. Give a detailed account on microbial spoilage of food.
12. Explain industrial production of vitamin B12.
13. Explain cell lysis techniques.
14. Explain industrial production of citric acid.
15. Give an account on methods of food preservation.
16. What is growth kinetics? Explain in detail.

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