(2014 Batch Onwards)

G 501.6a Reg. No. : | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI– Degree Examination

September - 2020

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) State radioactive decay law. Give its mathematical form.
b) What is K – electron capture?
c) What are isotopes? Give an example.
d) What is east-west effect? Why does it occur?
e) Write any two characteristics of nuclear force.
f) What are the drawbacks of LINAC?
g) How are thermal neutrons produced in a reactor?
h) What is pair anhilation?
i) Draw G.M characteristics.
j) What is a small signal amplifier?
k) Draw the circuit diagram of a non-inverting adder.
l) Explain positive feedback. Where is it used?

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

3. a) Derive the α particle scattering formula, assuming the expression for impact parameter. **(6)**
   b) Explain the three types of beta decay. **(4)**

4. a) Explain the classification of fundamental particles with respect to mass and spin. **(6)**
   b) What are cosmic ray showers? Give the cascade theory of showers. **(4)**

UNIT – II

5. a) With a neat diagram, describe the construction and working of a betatron. **(6)**
   b) Explain the properties of neutron. **(4)**

6. a) With neat diagram, explain the working of linear accelerator. Derive the condition for acceleration in a LINAC and mention the expression for energy of particles ejected from the accelerator. **(6)**
   b) Explain nuclear fission and nuclear fusion with an example for each. **(4)**

Contd...2

7. a) Describe the working of a G.M tube with the necessary diagram. Explain the quenching action that takes place in the GM detector. (6)

b) Explain thermonuclear reactions. How can it happen in stars? (4)

UNIT – III

8. a) Explain the h-parameter model of CE amplifier and derive the expressions for input resistance, output resistance, current gain, voltage gain and power gain. (6)

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

9. a) Explain the frequency response of a CE amplifier. (6)

b) Explain how sustained oscillations are obtained with the help of positive feedback. (4)

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

b) Explain how phase inversion takes place in a CE amplifier. (4)

SECTION – C

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

11. The mean half-life of radium – 226 is 1600 years and that for radon – 222 is 3.8 days. Calculate the mass of radon gas that will be in equilibrium with 1 gram of radium.

12. Find the threshold energy of the nuclear reaction ${}^{14}_{7}\mathrm{N}(\mathrm{n},\alpha){}^{11}_{5}\mathrm{B}$.

Given: Mass of ${}^{14}_{7}\mathrm{N}$ =14.003074 amu

Mass of ${}^{11}_{5}\mathrm{B}$ =11.009305 amu

Mass of ${}^{1}_{0}\mathrm{n}$ =1.0086665 amu

Mass of α-particle = 4.002603 amu

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

14. A city requires 100 MW of electrical power per day which is supplied by a nuclear reactor of efficiency 40%. Calculate the amount of ${}^{235}_{92}U$ fuel required per day.

Given: Energy released per fission of ${}^{235}_{92}U$ is 200 MeV.

Avogadro's number = $6.02\text{X}10^{23}$ mol^{-1}.

15. Radius of the dees of a cyclotron is 15cm. The applied magnetic field strength is 1.5T. Calculate the energy of emerging protons.

16. If $R_c = 10\,K\Omega$, $R_E = 0.1\,K\Omega, R_L = 2.2\,K\Omega$, $R_2 = 10\,K\Omega, h_{ie} = 4K$, $h_{fe} = 200$. Find A_i, A_v, R_i, R_i^1 and R_o for a small signal amplifier.

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(2014 Batch Onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI– Degree Examination

September - 2020

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? What is its advantage?

b) Draw the block diagram of TV communication system.

c) Mention any two advantages of FM.

d) Explain the terms, sensitivity and fidelity of a radio receiver.

e) Explain the steps to realize AND gate using NAND gates.

f) Write the truth table for two input NOR gate.

g) Write the truth table for Boolean equation $y = a\bar{b} + ab$.

h) Write the logic diagram and symbol of clocked RS flip-flop.

i) What is isotope effect? What is its implication?

j) Define critical field. How does it vary with temperature?

k) What do you mean by polarization of a dielectric? Write the expression for the polarization vector of non-linear dielectric.

l) What are quantum dots? Mention one special property of a quantum dot.

SECTION – B

Answer TWO full questions from each unit:

UNIT – I

2. a) Explain the construction of CRT with diagram. How does it reconstruct the image of a signal? **(6)**

b) Obtain the expression for the power of an AM wave in terms of carrier power and modulation index. **(4)**

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

b) What is frequency modulation? Explain frequency modulation using wave diagram. **(4)**

4. a) Draw the block diagram of a AM superheterodyne receiver and explain the function of each block. **(6)**

b) Explain the mechanism of color separation in a color TV transmitter. **(4)**

UNIT – II

5. a) What is a logic gate? Explain the working of AND gate using discrete components. Write its truth table and symbol. **(6)**

b) State and prove De Morgan's theorems. **(4)**

Contd...2

6. a) What is a half-adder? Write its truth table and logic circuit. Starting from the truth table, obtain the Boolean equation and logic circuit of a full-adder. **(6)**

   b) Explain the working of RS flip-flop using NAND-gates. **(4)**

7. a) What is a binary counter? Explain the working of decade counter using JK flip-flop with truth table. **(6)**

   b) Construct EXOR gate using i) NAND gates and ii) Basic gates. **(4)**

UNIT – III

8. a) What is superconductivity? Explain BCS of super conductivity and discuss the effect of magnetic field on a superconductor. **(6)**

   b) What are type I and type II superconductors? Explain. **(4)**

9. a) Distinguish between linear and non-linear media. Explain the theory of second harmonic generation. **(6)**

   b) Explain any four applications of superconductors. **(4)**

10.a) Discuss the various types of nanoscale systems. Explain the structure of carbon nano-tube and its properties. **(6)**

   b) Explain Meissner effect and define Critical field. **(4)**

SECTION – C

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

11. Simplify the Boolean expression $Y = A\,B\,\overline{CD} + \bar{A}\,B\,\overline{CD} + B\,\overline{CD}$.

12. Prove the Boolean identity

    a) $A + \bar{A}B = A + B$ b) $(AB) + (A\bar{B}) = A$

13. A wireless transmitter radiates 500kw with a modulated carrier wave. If the carrier power is 4kw, calculate percentage of modulation. What is the total power if the percentage of modulation is 80%?

14. An AM wave is represented by the expression,
    $V = 8(1 + 0.5\cos 6280\,t)\sin 211X10^4 t.$

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

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

15. Calculate the modulation factor of an AM wave, if the maximum peak-to-peak voltage is 14mV and the minimum peak-to-peak voltage is 3mV. Using this value, determine the total power of the AM wave, if the power of the carrier wave is 6KW.

16. The critical field of a super conductor is $1.6x10^5$ A/m at 15K and $5.2x10^5$A/m at 12 K. Determine the critical field at OK and critical temperature.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

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) Calculate number of modes of vibration in water molecule.

b) N_2 is IR inactive but Raman active. Give reason.

c) Define Phase. Give an example.

d) Calculate Zero point energy of hydrogen in Joule/mole.
The fundamental vibrational frequency of hydrogen is $4400x10^2m^{-1}$ ($h=6.62x10^{-34}$ JS)

e) What is meant by labile complex? Give an example.

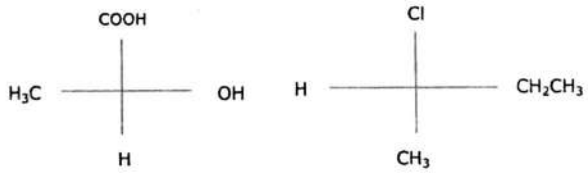
f) What is EAN rule?

g) What is Ziegler Natta catalyst? Give its use.

h) Give any two applications of organolithium compounds.

i) What are enantiomers?

j) Assign R and S configuration for the following.



k) Give Keto-enol tautomers of ethylaceto acetate.

l) Give the synthesis of succinic acid.

PART – B

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

i) Discuss different modes of vibrations in CO_2 type molecule.

ii) The vibrational-rotational spectrum of CO shows an absorption band at $2170x10^2m^{-1}$. Calculate the force constant (velocity of light=$3x10^8ms^{-1}$) reduced mass of CO is $1.13877x10^{-26}$kg.

iii) Explain formation of stokes and antistokes lines in Raman spectra.

iv) Explain the following terms:

a) Degrees of freedom b) Triple point c) Eutectic point

Contd...2

v) Derive an expression for stepwise formation constant of the complex.

vi) Explain the structure of $Ni(CO)_4$.

vii) Give any two methods to synthesize organomercury compounds.

viii) Explain the structure of Al_2Me_6.

ix) Give the alkylation reactions of diethyl malonate.

x) Explain the optical activity in lactic acid.

xi) Explain Geometrical isomerism in oximes.

xii) Explain Walden inversion with an example.

PART – C

Answer any TEN of the following questions. **(5x10=50)**

3. Sketch the energy levels for a simple harmonic oscillator for a typical diatomic molecule. Explain anharmonic behavior of diatomic molecule.
4. Explain the applications of Raman spectroscopy.
5. Give the thermodynamic derivation of Gibbs phase rule.
6. Discuss the phase diagram of water system.
7. Give any five properties of Grignard reagents with equations.
8. Explain substitution reaction in Pt(II) complexes.
9. Explain nature of bonding in metal carbonyls.
10. Explain the spectrophotometric method to determine the stability constant.
11. Explain conformational isomerism in cyclohexane. Write a note on relative stability of the conformers.
12. How are the following synthesized?
    a) Crotonic acid b) Keto acid
13. Explain the methods to determine the configuration of geometrical isomers.
14. What are diastereoisomers? Explain using 3-bromo – 2-butanol.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

CHEMISTRY- PAPER VIII

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

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

PART – A

1. **Answer any <u>TEN</u> of the following questions in 1 to 3 sentences** **(2x10=20)**

a) Give Debye Huckel Onsgar equation and explain the terms involved in it.

b) What is meant by activity and activity coefficient?

c) Mention any two advantages of potentiometric titration.

d) The equivalent conductance of 0.01N solution of weak acid was found to be 1.5 Sm^2/ gram equivalent. If the equivalent conductance at infinite dilution was $3.0x10^3$ sm^2/gram equivalent. Calculate the dissociation constant of weak acid.

e) Water gas has higher calorific value than producer gas. Give reason.

f) What is meant by Cetane number?

g) What are propellants? Give an example.

h) What are particulate matter? Mention their adverse effect.

i) Why TMS used as a reference compound in NMR?

j) What is a mordant dye? Give an example.

k) Define isoprene rule.

l) Which of the following nuclei produce NMR spectra

i. $^{12}_{6}C$ ii) $^{1}_{1}H$ iii) $^{14}_{7}N$ iv) $^{16}_{8}O$

PART – B

2. **Answer any <u>TEN</u> of the following questions in 2 to 5 sentences** **(3x10=30)**

i) The speed ratio of Ag^+ to NO_3^- ion was found to be 0.916 during the electrolysis of $AgNO_3$. Find the transport number of Ag^+ & NO_3^- ions.

ii) Explain the principle of conductometric titration of strong acid and strong base.

iii) Write a short note on liquid junction potential.

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

v) Give any six principles of green chemistry?

vi) What are green house gases? How do they cause global warming?

vii) Name any two types of glasses. Write their composition and uses.

viii) Explain the manufacture of TNT and RDX.

Contd...2

ix) Give the synthesis of congo red.

x) Explain the NMR spectra of ethylacetate.

xi) Explain the molecular orbital theory of colour.

xii) Give the structure of menthol and camphor.

PART – C

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

3. Define transport number of an ion. How it is determined by moving boundary method?
4. How do you determine the pH of a solution using quinhydrone electrode? What are its disadvantages?
5. What are reference electrodes? Explain the construction and working of calomel electrode.
6. How is solubility product of a sparingly soluble salt determined by conductance measurement?
7. Explain two factors causing soil pollution and suggest the methods for controlling soil pollution.
8. Define atom economy. Complete the following equations and calculate the atom economy.
   i. $C_4H_9OH + NaBr + H_2SO_4 \longrightarrow$
   ii. $CH_3\text{-}CH_2\text{-}\underset{\underset{CH_3}{|}}{CH}\text{-}N^+(CH_3)_3 + OH^- \xrightarrow{\Delta}$
9. Describe the manufacture of glass.
10. Discuss the production of biogas.
11. Define Chemical shift. Explain any two factors affecting chemical shift.
12. Explain the structural elucidation of nicotine.
13. With suitable example, explain the classification of dyes based on the structure.
14. Explain the principle of ^1H NMR spectroscopy.

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(2014 batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
September - 2020
MATHEMATICS – Paper VII
PARTIAL DIFFERENTIAL EQUATIONS, FOURIER SERIES AND LINEAR ALGEBRA

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

Note: Answer all Parts

PART - A

Answer any TEN of the following: **(10 x 2 ½ =25)**

1. Check for the integrability condition
   $(yz + xyz)dx + (zx + xyz)dy + (xy + xyz)\,dz = 0.$
2. Solve : $(x^2y - y^3 - y^2z)dx + (xy^2 - x^2z - x^3)\,dy + (xy^2 + x^2y)\,dz = 0.$
3. Solve $\frac{dx}{z^2y} = \frac{dy}{z^2x} = \frac{dz}{y^2x}$.
4. State the Dirichlet condition for the existence of Fourier expansion.
5. Find the half range sine Series of $f(x) = x,\ 0 < x < \pi$.
6. Find b_n in the Fourier Series expansion of $f(x) = 1 + x$ in $(-1, 1)$.
7. Prove that the sum of 2 subspaces is also a subspace.
8. Prove that T: $R^2 \to R^3$ defined as $T(x, y) = (x + y,\ x - y, 2x)$ is a linear transformation.
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. Prove that sum of the two linear transformations is a linear transformation.
11. Prove that image of a linear transformation is a subspace.
12. Define (i) Idempotent matrix (ii) Nilpotent matrix.
13. Find the row rank of a matrix $A = \begin{bmatrix} 6 & -2 & 18 \\ -4 & 1 & 11 \\ -5 & 2 & 16 \end{bmatrix}$.
14. If $A \epsilon Mn(F)$ has $q(x)$ as the minimum polynomial and $f(A) = 0$, then prove that $q(x) | f(x)$.
15. Define minimum polynomial of a matrix $A \epsilon Mn\,(F)$.

PART - B

UNIT - I

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

1. Solve: $(y + z)dx + (z - x)\,dy - (x + y)dz = 0$ by the method of auxiliary equation.
2. Solve :$xydx + (x^2y - zx)dy + (x^2z - xy)dz = 0.$
3. Solve : $(\,yz + z^2)dx - xzdy + xydz = 0.$
4. Solve : $z^2dx + (z^2 - 2yz)\,dy + (2y^2 - yz - xz)dz = 0.$
5. Solve: $\frac{dx}{x(x+y)} = \frac{dy}{-y(x+y)} = \frac{dz}{-(x-y)(2x+2y+z)}$.

Contd..2

UNIT - II

Answer any TWO of the following: **(2 x 7 ½ = 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. Find the half range sine and cosine series of $f(x) = \pi - x$ in the interval $[0, \pi]$.
3. Obtain the Fourier Series for $f(x) = e^{-x}$ in the interval $0 < x < 2\pi$.
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 x 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 $w_1, w_2, \ldots, w_m$ are linearly independent in V, then prove that $m \leq n$.
3. If $u, v \in V$ an inner product space, then prove that $|(u, v)| \leq \|u\| \, \|v\|$.
4. Let V be a finite dimensional vector space and W be a subspace of V, then prove that

   $dim\, W \leq dim\, V$ and $\dim \frac{V}{W} = \dim V - \dim W$.
5. State and prove Schwartz's inequality.

UNIT - IV

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

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

UNIT - V

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

1. Find the inverse of the matrix $A = \begin{bmatrix} 4 & 0 & 1 \\ 2 & 3 & 6 \\ 6 & -3 & -1 \end{bmatrix}$ using elementary row operations.
2. i) Define characteristic root an d characteristic polynomial of a matrix.

   ii) Find the characteristic roots of the matrix $A = \begin{bmatrix} 2 & 3 & 5 \\ 0 & -1 & 4 \\ 0 & 0 & 3 \end{bmatrix}$.
3. Prove that similar matrices have the same minimum polynomials.
4. If $A \in M_n(F)$ then prove that there exists $f(x) \in F[x]$ such that $f(A) = 0$.
5. State and prove Cayley- Hamilton theorem.

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St. Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

MATHEMATICS – Paper VIII

Numerical Methods

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

Note: Answer all parts

PART – A

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

1. Calculate the value of $\sqrt{102} - \sqrt{101}$ correct to 4 significant figures.
2. What is the condition on $|\phi'(x)|$ in the method of iteration given by $x_{n+1} = \phi(x_n)$.
3. Write the Newton-Raphson formula for finding the root of $f(x) = 0$.
4. Evaluate $\Delta^2 ab^x$, interval of difference being unity.
5. What is the 6^{th} order forward difference for a polynomial of degree 5?
6. Prove that $[x_0, x_1, x_2] = [x_2, x_1, x_0]$.
7. Evaluate $\int_0^1 cosx dx$ using Trapezoidal rule with $h = 0.5$.
8. Write Simpson's $3/8^{th}$ rule for $\int_{x_0}^{x_3} y\, dx$.
9. Write the formula $\frac{dy}{dx}$ for Newton's backward differences.
10. Find the column norm of the matrix $\begin{bmatrix} 3 & -2 & 4 \\ -5 & 3 & 6 \\ 6 & 7 & -9 \end{bmatrix}$
11. Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 3 & 2 & 1 \end{bmatrix}$
12. When do you say that the system $Ax = B$ is in-consistent?
13. Describe Taylor's Series method in solving a first order linear differential equation $y' = f(x, y)$, $y(x_0) = y_0$.
14. Using Runge-Kutta 2^{nd} order method find $y(0.2)$, given that $\frac{dy}{dx} = \frac{y^2 - x^2}{y^2 + x^2}$ take $h = 0.2$.
15. Write Adams-Bashforth predictor formula.

PART – B

UNIT – I

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

1. Solve $x^3 - 2x - 5 = 0$, correct to 3 decimal places using bisection method.
2. Let α be a root of $f(x) = 0$, and let I be any interval containing the point $x = \alpha$, Let $\phi(x)$ and $\phi'(x)$ be continuous in I, where $\phi(x)$ is defined by $x = \phi(x)$, Prove that $|\phi'(x)| < 1$ $\forall x$ in I. Then the sequence of approximations $x_0, x_1, \ldots, x_n$ defined by $x_{n+1} = \phi(x_n)$ converges to the root α.

Contd...2

3. Find a real root of the equation $x^3 - 2x - 5 = 0$ by the method of false position correct to 3 decimal places.
4. Find by Newton's Raphson method, the real root of the equation $3x = \cos x + 1$ correct to 4 decimal places.
5. Find the double root of the equation $x^3 - 5x^2 + 8x - 4 = 0$ choose $x_0 = 1.8$.

UNIT – II

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

1. Derive Newton backward difference formula for interpolation.
2. Using Lagrange's formula, express the function $\frac{3x^2+x+1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions.
3. 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

4. Find the polynomial $f(x)$ by using Lagrange's formula.

x	0	1	2	5
$f(x)$	2	3	12	147

5. Given the values x and $f(x)$, find f (0.29).

x	0.20	0.22	0.24	0.26	0.28	0.30
$f(x)$	1.6596	1.6698	1.6804	1.6912	1.7024	1.7139

UNIT – III

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

1. Using Newton's divided differences formula, find the missing value from the table.

x	1	2	4	5	6
y	14	15	5	--	9

2. Find $\frac{dy}{dx}$, at $x = 1.1$, from the following table.

x	1.0	1.1	1.2	1.3	1.4	1.5	1.6
y	7.989	8.403	8.781	9.129	9.451	9.750	10.031

3. From the following table, find x for which y is maximum. Hence find the value of y.

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

4. Derive Simpson's $\frac{1}{3}$ rule in the stndard form.
5. Use the Trapezoidal rule to estimate the integral $\int_0^2 e^x dx$ taking the number of 5 intervals.

UNIT- IV

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

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

Contd...3

2. Solve the system of equations by matrix inverse method.
   $3x + y + 2z = 3,\ 2x - 3y - z = -3,\ x + 2y + z = 4$
3. Explain the Gauss-elimination method to solve the nxn system of linear equations.
4. Solve the system of linear equations by Gauss-Seidal method.
   $20x + y - 2z = 17,\ 3x + 20y - z = -18,\quad 2x - 3y + 20z = 25$
5. Apply Gauss-Jordan method to solve the equations
   $x + y + z = 9,\quad 2x - 3y + 4z = 13,\quad 3x + 4y + 5z = 40$

UNIT – V

Answer any THREE of the following. **(3X5=15)**

1. Solve $y' = x - y^2,\ y(0) = 1$, find $y(0.1)$ correct to 4 decimals by Taylor Series method.
2. Using modified Euler method find $y(0.1)$ for the equation $y' = x^2 + y$, given $y(0) = 1$ (Take h=0.05).
3. Derive Runge-Kutta 2nd order formula.
4. Find the value of y for $x = 0.1$ by Picards method given that $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$.
5. Given $\frac{dy}{dx} = x^2(1 + y)$ and $y(1) = 1,\ y(1.1) = 1.233,\ y(1.2) = 1.548,$ $y(1.3) = 1.979$.
   Evaluate $y(1.4)$ by Adams-Bashforth method.

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(2007 batch onwards)

G 503.6b(v) Reg. No: | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

MATHEMATICS – Paper VIII

MATHEMATICAL MODELING

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

Note: Answer all parts

PART – A

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

1. A raindrop beginning at rest falls from a cloud 1024 feet high. How long does it take to reach the ground? What is the velocity when it strikes the ground?
2. Show that if x is the distance traveled by falling body, dropped from rest then $\frac{dx}{dt} = 8\sqrt{x}$.
3. State the Stoke's law.
4. Find what proportion of women with the p = 0.1 have a waiting time less than the mean for p=0.1.
5. If the daily carrying cost and daily sales are doubled then find the change in the optimal order size.
6. Suppose a measuring process is applied to an object has probability density function

$$y = \begin{cases} \frac{1}{12} & if\ 0 < x < 12 \\ 0 & for\ all\ other\ x \end{cases}$$

What is the probability of getting a measurement between 2 and 3?

7. If the manufacturer charges 0.06/item in addition to the ordering cost, then modify the formula for the totally yearly cost?
8. Draw the curves representing $p(t)=r^t p(o)$.
9. When is a mathematical model general?
10. Define system error and random error?
11. Give the algorithm for pivot transform.
12. Apply Northwest corner rule for the following table, calculate the cost.

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

Contd....2

13. Define Euler graph.
14. Find the first two terms of solution of

$x(t+1)-x(t)=[x(t)]^2+2t^3,\ \ x(0)=0.$

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

PART – B

UNIT - I

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

1. Explain the building of a model for manufacturing progress curve with suitable example.
2. Find the escape velocity using inverse square law model.
3. Construct the manufacturing progress curve for airplane with progress rate of 80%.
4. Derive the expression $p(t) = r^t p(o)$, for a population growth model.
5. Suppose the current population of a city is 25,00,000 and birth rate is b=0.02, death rate d= 0.01. What will be the population in 5 years. Find the number of deaths between t=10 and t=11. How many years it will take for the population to double its initial size?

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. Explain the family planning model and find an expression for $\bar{w}$ and s_m.
5. Suppose the measurement prows of weighing NBIO on a certain scale describe normal distribution with mean 404.3 and variance 4.4. What is the probability that the next two weighings will result in 415 ± 1 and 400 ± 1 in order?

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.

Contd...3

2. C_{14} isotope of carbon undergoes a radio active decay and transforms into C_{12}. Find the best fitting straight line for the following data, which gives the function 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 = 0.40x -1.48 for the table

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

4. Construct the college Enrollment model.
5. The following data is concerned with growth of a plant. Fit a least squares line and use it to predict the height at 4½ months and at 5 years.

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

Unit -IV

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

1. A refrigerator compartment is to be built in the shape of box and with a capacity of 8000 cubic feet. To save energy cost find the dimensions that will minimize the amount of heat entering from outside. Heat flow into the box is given as 1 unit/sq ft. through the top, 3 units/sq ft through the bottom and 2 units/sq ft from the sides.
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 $P = x\left(\frac{10}{100+x}\right)^2$, If x can be any positive number how should we choose it to get maximum power.
4. Maximize $p = 1000x + 500y$. subject to $x \geq 0,\ y \geq 0,\ 4x + y \leq 10$ and $18x + 15y \leq 66$ using simplex method.
5. Minimize : $P = 3x + 2y$ graphically subject to $x, y \geq 0,\ 5x + 7y \geq 35$ and $10x + 4y \geq 40$.

Contd...4

UNIT – V

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

1. State north west corner rule and apply it to the table.

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

2. Explain the algorithm for construction of Euler's circuit in a graph.

3. Solve the transformation problem of the following data.

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

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

	D_1	D_2	D_3
S_1	(56) 4	28	8
S_2	(16) 16	24 (60)	36
S_3	8	16 (36)	24 (41)

5. State the rules for stepping stone method.

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G 503.6b (vi)

(2014 Batch onwards)

Reg. No: | | | | | | |

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
September - 2020
MATHEMATICS – Paper VIII
Distribution Theory

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

Note: Answer all parts

PART – A

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

1. Distinguish between probability mass function and probability density function.
2. Show that $E(-X/a) = -\frac{1}{a}\ E(X)$.
3. Suppose F(X) is a cumulative distribution function, then show that
   $P(a < x < b) = F(b) - F(a)$
4. Derive the variance of a Bernoulli Random Variable.
5. If 1 and 2 are the modes of a Poisson Distribution, find the probability that the variable takes the value greater than zero.
6. A random variable assumes values 1 and -1 with probabilities p and $q = 1 - p$. Find the mean and variance.
7. If $X \sim B(n_1,\ p_1)$ and $Y \sim B(n_2,\ p_2)$, examine whether $X + Y$ is a Binomial variate.
8. If X is a normal variate with mean - 30 and variance 16 obtain the points of inflection of this distribution.
9. Define Beta distribution of second kind.
10. A random variable X is distributed uniformly over the interval $(0, \theta)$. Find its mean and variance.
11. State any two properties of Bivariate Normal Distribution.
12. If X has a p.d.f $f(x) = \theta e^{-\theta x},\ x \geq 0$, find its mean.
13. State central limit theorem.
14. Suppose $E\ (XY) = 20$, E(X) = 10, E(Y) = 2, $E(X^2) = 120$ and E $(Y^2) = 16$. What is the correlation coefficient between X and Y ?
15. State Markov's inequality and explain its application.

PART – B
UNIT - I

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

1. Verify whether the following is a p.d.f. Deduce its mean and variance
   $f(x) = \begin{cases} 6x(1-x), & 0 < x < 1 \\ 0, & otherwise \end{cases}$
2. Define Mathematical expectation. State and prove multiplication Theorem of Expectation.
3. a) If P (X = 3) = $\frac{2}{3}$ and P(X = -2) = $\frac{1}{3}$ find E(X) and V(3X+4).

   b) Find the value of K in the following probability distribution and hence find its variance.

x	4	6	8	10	12
$P(x)$	$1/8$	$1/6$	K	$1/4$	$1/12$

(3+4 ½)

Contd....2

4. For the following bivariate probability distribution find the correlation coefficient.

X \ Y	1	2	3	4
-1	0.05	0.15	0.1	0.05
0	0.1	0.05	0.02	0.03
1	0.2	0.1	0.1	0.05

UNIT - II

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

1. Find the mode of Binomial distribution.
2. Obtain MGF of Geometric Distribution. Using this find mean and variance.
3. Derive mean and variance of negative Binomial distribution.
4. a) Assume that half the population is vegetarian so that the chance of an individual being a vegetarian is ½. Assuming that 100 investigators each take a sample of 10 individuals to see whether they are vegetarians, how many investigators would you expect to report that three people or less were vegetarian?

   b) The probability that a target is destroyed on any shot is 0.3. What is the probability that it would be destroyed on the fifth attempt? **(4 ½ +3)**

UNIT - III

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

1. State and prove memoryless property of Exponential distribution.
2. Derive the expression for central moments of Normal distribution and hence show that the distribution is symmetric.
3. Obtain an expression for mean and variance of Beta distribution of second kind.
4. a. The height measurements are Normally distributed with mean 168 cms and S.D 6 cms. Find the probability that the height of a person is
      i) More than 140 ii) Less than 70
   b. Derive Median and variance of Exponential variate with parameter θ.

(3+4 ½)

UNIT - IV

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

1. If (X, Y) has Bivariate Normal Distribution, obtain the conditional distribution of Y given $X = x$.
2. Suppose (X, Y) has a Bivariate Normal Distribution, then X & Y are independent if and only if X & Y are uncorrelated. Justify.

Contd....3

3. Deduce the MGF of Bivariate Normal Distribution and hence obtain its mean and variance.
4. Let X and Y have BND with $\mu_X = 10$, $\mu_Y = 20$, $\sigma_X{}^2 = 1, \sigma_Y{}^2 = 64$ and $\rho = 0$.
   Find i) $P[(X+Y) \leq 10]$ ii) P[(X+Y) ≥ 8] iii) P[(4X+Y) ≤ 8].

UNIT - V

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

1. State and prove Lederberg levy Central Limit Theorem.
2. a) If $x_i (i = 1, 2, \ldots, n)$ can assume only two values i^k and $-i^k$ with equal probabilities. Show that WLLN holds for the sequence $x_1, x_2, \ldots$ if $k < \frac{1}{2}$.

   b) A distribution with unknown mean μ has variance 2.5 use CLT to find how large a sample should be taken from the distribution inorder that the probability will be atleast 0.90 that the sample mean will be within 1.5 of the popular mean.

   (4+ 3½)

3. Define convergence in probability and convergence in distribution with atleast 2 applications and state any two basic results of convergence in probability.
4. a) 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 $P\left[x_n = -\frac{1}{\sqrt{n}}\right] = \frac{1}{4}$.

   b) 8 fair dice are rolled independently 800 times. Let X be the number of 6's on 800 trials. Using CLT compute

   i) $P(X > 250)$ ii) P (X < 300). **(4½+ 3)**

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(2015 Batch onwards)

G 504.6a

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

ELECTRONICS – Paper VII

Biomedical Instruments, VLSI and Robotics

Note: This question paper has three sections. Section A, Section B and Section c. Answer all sections.

Time: 3 hrs. **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. (12x1=12)

i) EMG is related to activities of _____
a) Brain b) Heart c) Muscles d) Nerve fibers

ii) _____ transducer converts light energy into electrical energy.
a) Microphone b) Piezoelectric c) Photoelectric d) Thermoelectric

iii) _____ electrodes are used to measure bioelectric potentials with in a single cell.
a) Needle electrodes b) Microelectrodes
c) Surface electrodes d) Limb electrodes

iv) CLB is acronym for _____
a) configurable logic block b) configurable logic buffer
c) critical logic block d) critical logic buffer

v) The upper limit of blood pressure is called _____
a) systolic pressure b) diastolic pressure
c) distolic pressure d) none of these

vi) The ratio between output voltage signal and input voltage signal in an instrument is defined as _____
a) precision b) resolution c) gain d) CMRR

vii) The basic role of an electrode is to convert _____
a) light signal to ionic signal b) ionic signal to electrical signal
c) electrical signal to light signal d) light signal to electrical signal

viii) In CMOS Inverter, PULL UP network consists of _____
a) NMOS b) PMOS c) CMOS d) n-channel JFET

ix) CMOS offers low _____
a) input impedance b) output impedance c) gain d) power dissipation

x) Which transistor has high current driving capability?
a) BJT's b) PMOS c) NMOS d) CMOS

xi) Source of bioelectric potential is _____ in nature.
a) electronic b) electric c) ionic d) mechanical

Contd...2

xii) Recording electrical activities associated with heart is known as _____

a) EEG b) EOG c) EMG d) ECG

2. Answer any TEN questions. **(10x1=10)**

i) What do you mean by Ruggedness of a Transducer?
ii) What is a Resting potential?
iii) Define Dialysis.
iv) Define Diastolic Pressure.
v) Draw the block diagram of Biomedical instrumentation.
vi) Draw the circuit of CMOS NAND gate.
vii) Mention any one application of FPGA.
viii) Define PLD.
ix) Write the full form of VLSI.
x) What is meant by PULL DOWN circuit?
xi) How does a gear increases the speed?
xii) Define Mobility.

3. Answer any TEN questions. **(10x2=20)**

i) Mention any two types of Electrodes.
ii) Mention any two basic requirements of a Transducer.
iii) What is the difference between Transducer and Sensor?
iv) Explain a Capacitive Transducer.
v) Mention any two specifications of Instrumentation System.
vi) Explain the principle of measurement of Blood pressure.
vii) Mention any two differences between static and dynamic CMOS circuit.
viii) Explain how mechanical transmission takes place in a robot.
ix) Give the circuit of two input AND gate using CMOS.
x) With necessary diagram explain the classification of ASIC's.
xi) Mention any two advantages of FPGA.
xii) Define propagation delay in CMOS.

SECTION – B

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

i) Write a note on different types of microphones used in hearing aids.
ii) Write a note on LVDT.
iii) What is ECG? What are the diagnosis made from ECG?
iv) With block diagram explain Dialysis machine.
v) With neat circuit diagram explain the working of an IR sensor.
vi) Design a XNOR gate using VLSI technique.
vii) Explain the basic architecture of FPGA.
viii) Explain Robotic Peripherals with an example.

Contd...3

ix) Explain different types of joints used in Robotics.

x) Explain the basic architecture of PLD.

SECTION – C

Answer any THREE full questions. **(10x3=30)**

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

b) Explain any five Physiological signals based on energy. **(5)**

6. a) With necessary diagrams explain Impedance Pneumography. **(5)**

b) With necessary diagrams explain the working principle of Asynchronous cardiac pacemaker. **(5)**

7. a) Design a Half Subtractor using VLSI design techniques. **(5)**

b) With a neat diagram explain the working of a rotational encoder. **(5)**

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

b) A particular layer of MOS circuit has a resistivity $\rho = 2\ ohm.cm$. A section of this layer is $50\mu m$ long and $10\mu m$ wide and has thickness of $2\mu m$. Calculate the resistance from one end of this section to others (along the length). What is the value of sheet resistance "R_s"? **(5)**

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(2015 batch onwards)

G 504.6b Reg. No.

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

ELECTRONICS – Paper VIII

8086 Microprocessor and C language

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

Note: This question paper has THREE sections. SECTION A, SECTION B and SETION C. Answer all SECTIONS.

SECTION – A

1. Choose the correct answer from the choices given at the end of each question and write the correct answer. (12x1=12)

i) In 8086 μP, the stack contains _____ type of registers.

a) LIFO b) FIFO c) LILO d) FILO

ii) The instruction LOOPE repeats the loop as long as _____

a) $CX = 0 \; and \; ZF = 0$ b) $CX = 0 \; and \; ZF = 1$

c) $CX \neq 0 \; and \; ZF = 1$ d) $CX \neq 0 \; and \; ZF = 0$

iii) In the statement N DB?, the variable N can hold _____

a) one 8-bit number b) one 16-bit number

c) one 4-bit number d) one double word number

iv) _____ instruction transfers control from a ISR to main program.

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

v) During string operations, the memory pointers are programmed in the auto decrement mode by making _____

a) DF=1 b) DF=0 c) TF=1 d) IF=1

vi) _____ instruction is used for table translation.

a) MOV b) MOVS c) XLAT d) LDS

vii) _____ is used as format specifier for character in C language.

a) % d b) % s c) % f d) % c

viii) Which of the following special symbol is allowed in a variable name?

a) *(asterisk) b) |(pipeline) c) -(hypen) d) _(underscore)

ix) Input/output function prototypes are defined in _____ header file

a) conio.h b) stdio.h c) stdlib.h d) dos.h

x) _____ is the correct way of initializing an array in C language.

a) int arr[3]=(1,2,3); b)int arr(3)={1,2,3};

c) int arr[3]={1,2,3}; d) int arr(3)=(1,2,3);

xi) The break statement in switch-case statement _____

a) Takes the control to the next case value
b) Takes the control outside the switch statement
c) Takes the control to the condition checking
d) Takes the control to the beginning of switch statement

xii) _____ is a valid variable name in C language.

a) basic-sal b) basic_sal c) _basic.sal d) basic.sal

Contd...2

2. Answer any TEN questions: **(10x1=10)**

i) What is the function of bus interface unit of 8086 μP?

ii) What is the significance of directives SHORT and NEAR used with unconditional branch instructions?

iii) What is the difference between LENGTH and SIZE directives?

iv) Write any two instructions to clear the accumulator in 8086 μP.

v) Mention any one advantage of interrupt I/0.

vi) What is meant by physical address?

vii) What is meant by identifiers in C language?

viii) How a string is declared in C language?

ix) Write the general format of function definition in C language.

x) What is the purpose of continue statement in C language?

xi) Mention the order of precedence of bitwise operators in C language.

xii) Give the output for the following C language statements

```
int x=10,y=10;
printf("%d%d", x++,++y);
```

3. Answer any TEN questions. **(10x2=20)**

i) Mention the functions of the following pins of 8086μP

a) $MN|\overline{MX}$ b) AD_0 -AD_{19}

ii) Mention the differences between JMP and CALL instructions.

iii) Give the content of registers and the carry flag after the execution of the following program segment.

```
MOV BX, 2400H
MOV CL, 02H
ROR BX,CL
```

iv) With syntax and example explain any one shift instruction used in 8086 μP.

v) Write an 8086 Program to add two numbers.

vi) What is the purpose of ALE signal during memory or I/0 Read/Write operations. Explain.

vii) Write the C language statements for the following

a) $\frac{a^2}{c}b+\frac{a+b}{d}$ b) $a^2k+ak^2+by+cd$

viii) Write any two statements to input a character from the keyboard.

ix) Explain putchar()function in C language.

x) With syntax explain while statement in C language.

xi) Write a C language program to accept a character from the key board and print its ASCII value.

xii) Write a C language program to check whether the number is even or not.

SECTION – B

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

i) Explain the general purpose registers of 8086 μP.

ii) Write an 8086 assembly language program to compare two strings for equality.

iii) Explain any two 'value returning' directives with examples.

iv) Write a C language program to sort an array of integers in ascending order.

contd..3

v) Explain the arithmetic operators in C language. Give examples.

vi) Explain any two storage classes in C language.

vii) Identify the errors, if any, in the following C language statements

a)
```
if(m=1&n!=0)
printf("OK");
```
b)
```
if(x=<5)
printf("jump");
```
c)
```
int x=10;
float y=4.25;
x=y%x;
```
d)
```
int number:
printf('enter an integer number');
scanf(%d,number);
```

viii) With example, explain any two string functions in C language.

ix) Write a note on programmed I/O.

x) With example explain any two rotate instructions.

SECTION – C

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

5. a) With the bit pattern, explain the program status word (PSW) of 8086 μP. **(6)**

b) Explain the following directives with examples. **(4)**
i) EVEN ii) DW

6. a) Draw the pin diagram of 8086 μP and explain the functions of various pins. **(6)**

b) With example explain how data is stored and retrieved to and from the stack in 8086 μP. **(4)**

7. a) With example explain any three data types in C language. **(6)**

b) With syntax and example explain if-else statement in C language. **(4)**

8. a) What is a string? Explain how a string is defined and initialized in C Language. Write a program to concatenate two strings using string functions. **(6)**

b) What is meant by an entry controlled loop? Explain any one entry controlled loop structure in C language. **(4)**

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(2015 Batch onwards)

G 505.6a

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

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
September - 2020
COMPUTER SCIENCE – Paper VII
MICROPROCESSOR ARCHITECTURE AND PROGRAMMING

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

PART –A

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

a) Define a bus. What is the width of the data bus in 8086 microprocessor?

b) What is the effect of direction flag on DI and SI registers?

c) Differentiate the overflow flag and sign flag.

d) What is the use of DUP directive?

e) What is an assembler?

f) Give the syntax of MUL instruction.

g) What is the purpose of IRET instruction?

h) What is the use of NOP instruction?

i) Write any one instruction to clear BX register.

j) What is procedure?

k) How do you define a global variable?

l) Differentiate intersegment and intrasegment jumps.

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

a) Differentiate the carry and auxillary flag bits.

b) Represent $(76)_{10}$ in packed and unpacked BCD format.

c) What is the use of int 00H instruction?

d) Differentiate JA and JG instruction.

e) Explain the SEGMENT-ENDS directive.

f) What is the purpose of PUSHF and POPF instruction?

PART – B

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

Unit I

3. a) Explain with a neat diagram the internal architecture of 8086. **(8)**

b) Explain the following assembler directive with a syntax and example.
i) STRUCT ii) ASSUME iii) OFFSET iv) TYPE **(8)**

c) Write a note on the following development tool.
i) linker ii) assembler **(4)**

Contd...2

4. a) Explain any four data addressing modes of 8086 with example. (8)
   b) Explain with a diagram the flag registers of 8086. (6)
   c) Explain the procedure definition directive and macro definition directive with example. (6)

Unit II

5. a) What is REP Prefix? How it is used in string manipulation instruction? (8)
   b) Explain with syntax and example the various shift instructions. (6)
   c) Explain the purpose of DAA instruction with example. (6)

6. a) Write with an example explain the various logical instructions. (8)
   b) Elaborate LOOP, LOOPE, LOOPNE instructions with example. (6)
   c) Explain the use of SCAS, STOS and LODS primitives. (6)

Unit III

7. a) With a neat diagram, explain the process of creating and execution of a program. (8)
   b) Explain the operation of PUSH and POP instructions. Explain the role of SP and SS or BP and SS on it. (6)
   c) What are macros? Explain how a macro is written with an argument passed into it. (6)

8. a) How do you define and invoke a procedure? Explain with an example. (8)
   b) Write an algorithm to convert integer to ASCII. (6)
   c) Explain labels within a macro with an example. (6)

Unit IV

9. a) With a neat diagram explain how does an interrupt works? Explain the use of interrupt vector table. (8)
   b) Explain the method of transferring data through programmed I/O. (8)
   c) Explain the INT O4H interrupt. (4)

10.a) Explain the different levels of Input-Output structure programming. (8)
   b) List and explain the various interrupt routines of DOS. (6)
   c) Write the different ways in which the interrupts are classified based on its source and explain each one of them. (6)

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(2015 batch onwards)

G 505.6b

Reg. No. | | | | | | |

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
September - 2020
Computer Science – Paper VIII
Web Programming using PHP

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

PART–A

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

1. a) What is the use of colspan and rowspan attribute?
   b) How do you incorporate comments within PHP script?
   c) What are the rules for naming variables in PHP?
   d) Give an example for assigning values to an array.
   e) List any two categories of PHP error.
   f) List any two states to maintain state for a website.
   g) List the escaping special characters of PHP.
   h) List the differences between do-while and while loops.
   i) Name any two functions for error reporting.
   j) What is a session?
   k) What is the use of var_dump () function in PHP?
   l) Explain the PHP built-in function to add or remove elements from the beginning or end of an array.

PART–B

Answer any One full question from each unit. **(4x20=80)**

Unit I

2. a) Explain the following tags with example **(10)**
      i) <table>
      ii)
   b) What is the use of <marquee> tag? Explain the attributes of <marquee> tag with example. **(7)**
   c) Explain the differences between GET and POST methods. **(3)**

OR

3. a) What is CSS? Explain the process of embedding and importing style sheets. **(10)**
   b) Write a note on **(6)**
      i) web server ii) web browser
   c) Explain the inline style attributes. **(4)**

Contd...2

Unit II

4. a) Explain the PHP functions to test the data type of a variable. **(10)**

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

c) How to create and destroy variables in PHP? Explain **(4)**

OR

5. a) Write a note on **(10)**

i) Operator precedence
ii) Handling form input

b) Write a PHP script that accepts a temperature value in Celsius (c) through a web form and converts it into Fahrenheit (F) scale **(5)**

c) How to interrupt and skip loops? Explain. **(5)**

Unit III

6. a) How do you define a user defined function in PHP with variable length argument list? Explain with example. **(8)**

b) Write a program that reads an array and returns a message indicating whether the array contains only unique values. **(7)**

c) What are the two types of PHP arrays? How do they differ? **(5)**

OR

7.a) Explain the different MySQL data types. Give examples. **(10)**

b) How to format date and time in PHP? Explain the different date and time functions. **(10)**

Unit IV

8.a) With a programming example, explain the process of validating form input. **(10)**

b) Explain the different cookie attributes. **(5)**

c) Describe the methods of PHP Exception class. **(5)**

OR

9.a) Explain the PHP functions to create, register and erase sessions. **(8)**

b) How to Sanitize input and output? Explain. **(7)**

c) Write a note on custom exceptions. **(5)**

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(2016 Batch Onwards)

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St Aloysius College (Autonomous)

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B.Sc. - Semester VI

September - 2020

STATISTICS - Paper VII

SAMPLING THEORY

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

Note: Answer all parts

PART – A

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

1. What is a sample?
2. Define parameter and statistic.
3. Define Standard error of an estimator.
4. Mention different types of errors in sampling.
5. What do you mean by simple random sampling?
6. List all possible samples of size three under SRSWOR from a population consisting of five units Y_1, Y_2, Y_3, Y_4 and Y_5.
7. Briefly explain the need for stratification.
8. Show that stratified random sample mean is unbiased for the population mean.
9. Write down the expression for the standard error of $(\bar{Y}_{st})$.
10. State any two advantages of systematic sampling.
11. Write all possible systematic samples of size four from a population consisting of twenty units $Y_1, Y_2, Y_3, \ldots, Y_{20}$.
12. Explain sampling of attribute.
13. With usual notation prove that E(p)=P.
14. Describe optimum allocation in stratified random sampling.
15. What is cluster sampling? Give practical situation where it is used?

PART – B

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

16. Explain different types of sampling.
17. Explain the method of drawing a random sample from a frequency table.
18. Show that under SRSWR $E(s^2) = \sigma^2$.
19. Show that $\bar{y}_{st} = \sum W_h \bar{Y}_h$ is unbiased for the population mean in stratified random sampling. Also find its variance.
20. Derive an expression for the $V(\bar{y}_{st})$ under proportional allocation.
21. With usual notations prove that $V(\bar{y}_{st})_{prop} \leq V(\bar{y}_{SRSWOR})$.
22. Prove that in a stratified random sampling with given cost function of the form $C=a+\sum_{i=1}^{k} c_i n_i$ $V(\bar{y}_{st})$ is minimum if $n_i \propto \frac{N_i S_i}{\sqrt{c_i}}$.

Contd...2

23. With usual notation show that V(p)=$\frac{N-n}{N-1}\frac{PQ}{n}$.

24. With usual notations prove that systematic sampling is more efficient than SRS if $S^2_{wsy} > S^2$.

PART – C

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

25. a) What is a sample survey? When it is inevitable? **(5)**

    b) What are the advantages of sample survey? **(5)**

26. Prove that in SRSWOR, $E(s^2) = S^2$.

27. Prove that in stratified random sampling, the variance of the estimated mean $\bar{y}_{st}$ is minimum for a fixed sample size n if n_h is proportional to $N_h S_h$. Also obtain the expression for $V(\bar{Y}_{st})$ under Neyman's allocation.

28. With usual notations, prove that $V(\bar{y}_{sys}) = \frac{N-1}{N}S^2 - \frac{k(n-1)}{N}S^2_{wsy}$. Also compare $V(\bar{Y}_{sys})$ with $V(\bar{Y}_{srs})$.

29. Explain the principal steps in a sample survey.

30. a. Prove that, when there is a linear trend in the population

    $V(\bar{y})_{syst} \leq V(\bar{y})_{st} \leq V(\bar{y})_{SRS}$. **(7)**

    b. What do you mean by cluster sampling? State its merits and demerits. **(3)**

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St Aloysius College (Autonomous)

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B.Sc. - Semester VI

September - 2020

STATISTICS - Paper VIII

Operations Research

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

Note: Answer all parts

PART – A

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

1. Define Operations Research.
2. Define LPP.
3. Define a Surplus variable with an example.
4. What are artificial variables? What is the objective of these artificial variables?
5. State any two advantages of dual LPP.
6. Define Pivot.
7. With reference to a TP, define
   (i) Feasible solution (ii) Optimum solution
8. Define a loop.
9. What is a Transportation problem?
10. Give a real life example for Assignment problem.
11. Show that AP is a special case of LPP.
12. Define pure and mixed strategies theory of games.
13. What do you mean by the term Payoff matrix?
14. What do you mean by lead time in inventory problem?
15. What is Economic Order Quantity?

PART – B

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

16. Explain all the models of OR with an example.
17. Describe the graphical method of solving an LPP.
18. Discuss Charne's Big M method of solving LPP.
19. Explain the various phases of OR.
20. Show that in an AP, assignment remains unchanged when we subtract a constant from each element in a row.
21. Write the dual of the following LPP:

    Min $Z=x_1-2x_2+4x_3+2x_4$

    $x_1+x_2+x_3+x_4=10$

    $2x_1-x_2+5x_3+6x_4 \leq 25$

    $4x_1+3x_2-2x_3-x_4 \geq 15$

    $x_1, x_2, x_3, x_4 \geq 0$

Contd...2

22. Explain the dominance method of reducing the size of a payoff matrix in a two person zero sum game.
23. What are the characteristics of a Game?
24. Explain briefly the various costs involved in the inventory problem.

PART – C

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

25. Derive an Economic lot size formula for the optimum production quantity and the minimum total cost per unit, where lead time is zero, demand is uniform, production is instantaneous and there are no shortages.
26. Describe Hungarian method of solving an AP.
27. Explain the MODI method of finding an optimum solution to a TP.
28. Explain the graphical method of solving a 2 × n game.
29. Briefly explain purchase inventory models with price breaks. Discuss the situation when there are two price breaks.
30. Show that for a probabilistic inventory model with instantaneous demand and set up cost the optimum stock level z can be obtained by the relationship

$$\sum_{d=0}^{z-1} p(d) < \frac{c_2}{c_1 + c_2} < \sum_{d=0}^{z} p(d)$$

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Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

BOTANY – Paper VII

Plant Physiology

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

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

SECTION – A

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

1. Write the significances of Osmosis in plants.
2. Define D.P.D. and T.P.
3. What is cavitation? Write its significance.
4. What is Phloem loading and unloading?
5. What is Warburg's effect?
6. Define Red-Drop effect.
7. Calculate the net gain of ATP during aerobic respiration in plants.
8. What are C_4 plants? Give an example.
9. Name any two synthetic auxins.
10. What are short day plants? Give two examples.
11. What are Recalcitrant seeds? Give examples.
12. Comment on the type of movement observed in the leaflet of *Desmodium gyrans.*

SECTION – B

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

1. Explain water potential and its components.
2. Write a note on passive absorption of water.
3. Write a note on Root pressure theory.
4. Explain the process of photorespiration.
5. Write a note on fermentation.
6. Write a note Photo systems.
7. Discuss the physiological effects of A B A.
8. What is growth curve? Explain sigmoid curve.
9. Give an account of practical applications of vernalization.

Contd...2

SECTION – C

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

1. Explain the Transpiration Pull theory.
2. Give an account of Proton-exchange theory.
3. Write the physiological roles and deficiency symptoms of Phosphorus and Nitrogen.
4. Explain Calvin Cycle in detail.
5. Explain the process of terminal oxidation.
6. Write a note on:
   i) Photoperiodic Induction ii) Seed dormancy
7. Give an account of autonomic movement of curvature.
8. Discuss on Krebs Cycle in detail.
9. Write a note on:
   a) Arc auxanometer b) Biochemical changes during seed germination

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B.Sc. Semester VI – Degree Examination

September - 2020

BOTANY – Paper VIII

Molecular Biology II, Biotechnology, Plant Propagation and Pharmacognosy

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

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

SECTION – A

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

1. What is gene silencing? Mention its significance.
2. Mention any two transgenic plants and their uses.
3. Give any two differences between Anther culture and Pollen culture.
4. What is Pharmacognosy? Mention its branches.
5. Write the importances of Pentose phosphate Pathway.
6. What is callusing? Give its importance.
7. Give the organoleptic evaluation of crude drug from any seed.
8. Write any two applications of TLC.
9. What is Sidha system?
10. What are flavonoids? Write its uses.
11. Write any two therapeutic properties of steroids.
12. What are alkaloids? Mention any plant (scientific name) that contain alkaloids.

SECTION – B

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

1. What is Lac operon? Explain the process.
2. Write a note on organized crude drugs.
3. Comment on Monoclonal antibodies.
4. Write a note on therapeutic uses of carbohydrate crude drugs.
5. Write a note on any two protein based crude drugs.
6. Comment on factors affecting cultivation of medicinal plants.
7. What is bioremediation? Explain any two types of it.
8. Explain Ayurveda system of medicine.
9. What are resins? Explain any two crude drugs.

Contd...2

SECTION – C

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

1. Give a detailed account on Biohazard and Biosafety.
2. What is gene regulation? Explain the steps involved in gene regulation in Eukaryotic cells.
3. Give a detailed account on methods to detect adulterations.
4. Comment on nutrient requirements for tissue culture media.
5. Write a note on Homeopathy.
6. Give the Schematic representation of Mevalonic acid pathway and explain its significance.
7. Explain the principle, procedure and applications of spectroscopy.
8. Describe citric acid pathway and give its significance.
9. Explain the source, physico chemical and therapeutic properties of phenolics and glycosides.

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B.Sc. Semester VI – Degree Examination

September - 2020

ZOOLOGY – Paper VII

IMMUNOLOGY, MEDICAL ZOOLOGY, TOXICOLOGY, ECONOMIC ZOOLOGY

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

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

PART – A

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

a) What are Peyers patches? Where are they located?

b) Differentiate T_H cells and $T_c$cells.

c) What is capture fisheries. Mention the types.

d) Name any two fish diseases and the causative organisms.

e) What is clitellum? Mention its functions.

f) Define innate immunity with one example.

g) Name the causative agents of Giardiasis and Taeniasis.

h) Name the species of *Plasmodium*.

i) What is vector borne parasitic disease? Give an examples.

j) Write the uses of bee wax.

k) What is a desi breed? Give any two examples.

l) Mention the importance of cattle in biogas.

PART – B

Select ONE full question from each Unit.

UNIT - I

II. a) Explain the causative factors and mode of transmission and preventive measures of AIDS. **(10)**

b) Explain briefly the cells of immune system. **(5)**

c) Write notes on antigen and antibody. **(5)**

OR

III. a) Write a brief note on primary and secondary immune response. **(10)**

b) Explain the causative factors and mode of transmission of Arthritis. **(5)**

c) Write notes on Vaccines and immunization. **(5)**

Contd...2

UNIT – II

IV. a) Give a brief account of life history, mode of infection, transmission pathogenecity and Control measures of *Entamoeba*. **(10)**

b) Comment on Typhoid and Cholera. **(5)**

c) Explain vectors of parasitic diseases. **(5)**

OR

V. a) Explain parasitic diseases of Protozoans. **(10)**

b) Explain the life cycle of *Ascaris*. **(5)**

c) Write a note on pathogenecity of *Ancylostoma* and *Wuchereria* **(5)**

UNIT – III

VI. a) What is biomagnification? Explain citing suitable examples. **(10)**

b) Give a brief account of byproducts of milk. **(5)**

c) Describe the techniques used in culturing the pearl. **(5)**

OR

VII a) Write explanatory note on different types of tanks used in aquaculture. **(10)**

b) Write a short note on animal toxins. **(5)**

c) Write the morphology and life history of *Bombyx mori*. **(5)**

UNIT – IV

VIII a) Explain the different methods of bee keeping. **(10)**

b) Explain the process of preparation of vermicompost. Add a note on life cycle of earthworms. **(5)**

c) With reference to housing management explain intensive method in poultry. **(5)**

OR

IX. a) Explain the different stages of vermicomposting and preparation of vermiwash. **(10)**

b) Mention the different types of poultry diseases. **(5)**

c) Explain the caste system of honey bees. **(5)**

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B.Sc. Semester VI – Degree Examination

September - 2020

ZOOLOGY – Paper VIII

ETHOLOGY, EVOLUTION AND PALAEONTOLOGY

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

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

PART – A

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

a) What is imprinting? Give an example.

b) With respect to courtship behaviour explain display with example.

c) What is tactile communication? Give any two examples.

d) Give any two characteristics of biological clock? Mention any two types.

e) Define society. Name any two organisms exhibiting social behaviour.

f) Write any four advantages of bird migration.

g) Write a note on parental care in *Hippocampus.*

h) What is monogamy? Give an example.

i) What are homology and analogy?

j) Define Gene mutation.

k) What is allopatric speciation?

l) Write the characteristics of modern horse.

PART – B

Select ONE full question from each Unit.

UNIT - I

II. a) What is innate behaviour? Give an account of different types of innate behaviour. **(10)**

b) Explain the different components of communication. **(5)**

c) Explain the social behaviour in termites. **(5)**

OR

III. a) Explain visual communication with suitable illustrations. **(10)**

b) Write a note on play behaviour in animals with examples **(5)**

c) Explain foraging behaviour in animals, with suitable examples. **(5)**

Contd...2

UNIT – II

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

b) Explain the methods of studying bird migration with suitable illustrations. **(5)**

c) Write a note on nesting behaviour of Baya weaver bird. **(5)**

OR

V. a) Explain causes and types of bird migration. **(10)**

b) Explain the parental care in fishes. **(5)**

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

UNIT – III

VI. a) Give an account of evidences for organic evolution from comparative morphology and Anatomy. **(10)**

b) Explain the theory of chemical evolution. **(5)**

c) Write a short note on Lamarckism. **(5)**

OR

VII a) Explain the postulates of Neo- Darwinism. **(10)**

b) Write a note on Adaptive radiation in Darwin's finches. **(5)**

c) Explain briefly the theory of biogenesis. **(5)**

UNIT – IV

VIII a) Define microevolution. Add a note on mechanism of microevolution. **(10)**

b) With refererice to the evolutions of Dinosaurs describe **(5)**

a) *Stegosaurus*

b) *Triceratops.*

c) Define fossilization. Explain the method of preservation of fossils. **(5)**

OR

IX. a) Write explanatory notes on **(10)**

i) *Australopithicus* ii) *Neanderthal man.*

b) Define extinction. Explain any two extinct species. **(5)**

c) Define speciation. Explain the sympatric speciation with suitable illustrations. **(5)**

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(2014 Batch onwards)

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Mangaluru
B.Sc. Semester VI- Degree Examination
September - 2020
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) Theta replication
b) Mismatch repair
c) Blue white screening
d) ORF contents
e) Wobble
f) Base Analogues
g) DNA Finger Printing
h) Blast
i) SSB
j) F-prime
k) Yeast artificial chromosomes
l) Sequence alignment

PART B

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

UNIT – I

2. a) List and explain in detail the role of different enzymes in DNA replication.

OR

2. b) Explain the Lac Operon of E.coli. Add a note on genetic code. **(9)**

2. c) Write a note on added Watson and Crick Model of DNA. **(6)**

UNIT – II

3. a) Explain the mutations produced by chemicals.

OR

3. b) Define transformation. Explain in detail Griffith's experiment. **(9)**

3. c) Write briefly on Conjugation. **(6)**

Contd..2

UNIT – III

4. a) Explain in detail about PCR.

OR

4. b) Write in detail about DNA Ligation and introduction of vectors in host. **(9)**

4. c) Write briefly in metagenomics. **(6)**

UNIT – IV

5. a) Explain in detail protein data bank and sequence analysis.

OR

5. b) Explain the Human Genome Project. **(9)**

5. c) Write briefly on gene content of prokaryotic genome. **(6)**

PART –C

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

6. a) Transposable elements of bacteria.

b) Mutation as a tool in molecular genetics.

c) Specialised transduction.

d) NIF gene

e) Biosafety and Bioterrorism.

f) FASTA

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(2014 Batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI- Degree Examination
September - 2020
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 <u>any TEN</u> of the following **(2×10=20)**

a) Radurization
b) Sticky film
c) Wood Smoke
d) Baffles
e) SCP
f) Rancidity
g) TA Spoilage
h) RODAC
i) Anaerobic Fermentation
j) Cellar Storage
k) Foam Control
l) Alcohols

PART B

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

UNIT – I

2. a) Explain food preservation by using chemical preservatives.

OR

2. b) Explain food preservation by using High temperature. **(9)**

2. c) Write a brief note on canning. **(6)**

UNIT – II

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

OR

3. b) Explain the methods of microbiological examination of food. **(9)**

3. c) Write a brief note on Botulism. **(6)**

Contd..2

UNIT – III

4. a) Explain the industrial production of wine.

OR

4. b) Explain the industrial production of beer. **(9)**

4. c) Write a short note on Strain improvement. **(6)**

UNIT – IV

5. a) Explain in detail – production of Baker's Yeast.

OR

5. b) Explain in detail – production of penicillin. **(9)**

5. c) Write a short note on production of vinegar by the Orleans method. **(6)**

PART –C

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

6. a) Industrial production of SCO

b) Resazurin reduction test

c) Temperature control in a fermentor

d) Intrinsic factors for microbial growth in food.

e) Microflora of milk

f) General principles underlying spoilage of food.

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(2013 batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
September - 2020
BIOCHEMISTRY – Paper VII
MICROBIOLOGY, IMMUNOLOGY AND ENDOCRINOLOGY

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

Instructions: 1. Write the number and subdivision clearly.
2. Write equation and diagrams whenever necessary
3. Answer Part –A in the two pages of the answer book.

PART – A

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

a) Give the contribution of Alexander Fleming.
b) What is complex media? Give an example.
c) Name the reagents used in acid fast staining technique.
d) Mention the immunological role of spleen.
e) Write the application of RIA.
f) Mention the types of T-lymphocytes.
g) What is autoimmunity?
h) What are immunosuppressive agents? Give example.
i) Define totipotent and pluripotent stem cells.
j) Name the hormones and their functions produced by pancreas.
k) Mention the role of G-Protein as secondary messenger.
l) What are Gonadotropins? Give example.

PART – B

Answer any SIX of the following: **(5 x6=30)**

2. Write a note on HIV.
3. Give an account on factors influencing microbial growth.
4. What are monoclonal antibodies? Explain.
5. Explain the salient features of adaptive immunity.
6. Write short note on type – II hyper sensitive reactions.
7. Explain the process of Graft rejection.
8. Name the hormones of hypothalamus & mention their functions.
9. Explain the mechanism of steroid hormone action.

PART – C

Answer any FIVE of the following: **(10 x5=50)**

10. Explain the structure of bacteria. Add a note on Gram's staining.
11. Explain physical method of sterilization.
12. What are bacteriophages? Explain lysogenic and lytic cycle of T4 phage.
13. Explain i) Types of transplants ii) SCID
14. Give an account i) Clinical uses of stem cells
    ii) Basic structure of antibody
15. What are organ specific and systemic auto immune diseases? Explain with suitable examples.
16. Explain
    a) Concept of secondary messengers with cAMP and DAG as examples.
    b) Adjuvants

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(2013 batch onwards)

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester VI – Degree Examination

September - 2020

BIOCHEMISTRY – Paper VIII

CLINICAL AND MEMBRANE BIOCHEMISTRY

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

Instructions: 1. Write the number and subdivision clearly.
2. Write equation and diagrams whenever necessary
3. Answer Part –A in the two pages of the answer book.

PART – A

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

a) Write normal volume, pH and specific gravity of urine.

b) Why HDL is considered as good cholesterol?

c) Why LDH is called as marker enzyme?

d) Mention the types of anemia.

e) Write the difference between fluid mosaic and sandwich model.

f) What are Ionophores?

g) What are free radicals? Give example.

h) What is radioactive decay?

i) What are carcinogens? Give example.

j) Define endocytosis.

k) Define curie and Rad.

l) Differentiate between benign and malignant tumor.

PART – B

Answer any SIX of the following: **(5 x6=30)**

2. Write a note on abnormal constituents of urine.
3. How to differentiate serum and plasma? Add a note on serum lipid profile.
4. Explain different pathological conditions in Diabetes mellitus.
5. What is liver function test? Write the significance of liver marker enzymes.
6. Write a note on Hemophilia.
7. Explain active transport with suitable example.
8. Write about usage of radio activity in medicine.
9. Write about different types and properties of cancer cells.

Contd....2

PART – C

Answer any FIVE of the following: **(10 x5=50)**

10. a) Write the clinical significance and constituents of urea, uric acid and creatinine. **(5)**

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

11. Explain clinical symptoms of Pancreatitis, phenylketonuria and Neimann pick disease.

12. Explain chemistry and Functions of membranes. Add a note on unit membrane hypothesis.

13. How to measure radiation?

14. a) Explain the mechanism of carcinogenesis. **(5)**

    b) Write a note on tumour markers. **(5)**

15. a) How sugar is trans-ported through membrane. **(5)**

    b) Explain the mechanism of phagocytosis. **(5)**

16. What is radiation hazard? Which are the safety measure to be taken for radiation hazard.

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(2014 Batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
September - 2020
BIOTECHNOLOGY – PAPER VII
ENVIRONMENTAL BIOTECHNOLOGY

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

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

PART - A

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

a) Give two examples for common microorganisms seen in estuaries.

b) What is COD? Write one significance.

c) Expand BIS. Write one function.

d) Give two examples for phosphate solubilizing organisms.

e) Write the causative agents of Tuberculosis and Measles.

f) Define bioremediation. Mention the types.

g) Write two limitations of biopesticides.

h) Define biogeochemical cycle. Write one significance.

i) What are renewable resources? Give two examples.

j) Name any two organisms used in composting

k) Define mycorrhiza. Give the types.

l) Name any two environmental protection laws.

PART – B

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

2. Explain sampling techniques of trapping indoor air borne microorganisms.
3. Comment on the role of sea weeds in soil enrichment.
4. Give an account of soil pollution and its control measures.
5. Explain microbial bioremediation with an example.
6. Comment on the standards of water quality for drinking.
7. Write notes on GM foods.
8. Explain quantitative methods to study soil microorganisms.
9. Explain microbial hydrogen production.
10. Give an account of landfilling.

PART – C

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

11. Explain nitrogen cycle in detail.
12. Comment on secondary treatment of waste water.
13. Explain production of bacterial biopesticides.
14. Give a detailed account on energy gardens.
15. Explain enrichment of copper ores by microorganisms.
16. Give a detailed account on positive interaction among microorganisms in soil.

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G 511.6b

(2014 Batch onwards)

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester VI – Degree Examination
September - 2020
BIOTECHNOLOGY – PAPER VIII
BIOPROCESS TECHNOLOGY

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

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

PART - A

(10×2=20)

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

a) What is Pasteurization?

b) What are primary metabolites? Give any two examples.

c) List the any four component parts of fermentation process.

d) Mention any two criteria for selection of recovery process.

e) What is fed batch fermentation?

f) List any two criteria used for choosing industrially important organisms.

g) Name any two microorganisms used in the industrial production of citric acid.

h) List any two factors that affects the efficiency of filtration.

i) Define probiotics.

j) Define SGOT & SGPT.

k) What is Phosphatase test?

l) What is acidophilic milk?

PART – B

(6×5=30)

Answer any SIX of the following.

2. Explain continuous fermentation.
3. Illustrate advantages of bioprocess over chemical process.
4. Write a note on strain selection and improvement.
5. Describe the process of industrial production of vit.B_{12}.
6. Write a note on enzyme immobilization technique.
7. Write a note on rotary drum filtration technique.
8. Explain application of enzyme in food and textile industry.
9. Explain briefly the intrinsic factors affecting food spoilage.
10. Write a note on Botulism.

PART – C

(5×10=50)

Answer any FIVE of the following.

11. Discuss the media preparation for the production of industrially important products.
12. Explain the nutritional value of mushrooms. Add a note on culture techniques.
13. Explain the requirement and procedure for industrial production of penicillin.
14. Describe chemical preservatives and add a note on different chemical preservatives used in the food industry and their mode of action.
15. Discuss methods of cell disintegration.
16. Describe in detail primary screening of organism producing metabolites.

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(2016 Batch Onwards)

G 513.6a Reg. No. : | | | | | | |

St Aloysius College (Autonomous)

Mangaluru

B.Sc. - SEMESTER VI – Degree Examination

September - 2020

ECONOMICS – PAPER VII

INDIAN ECONOMICS

Time: 3 hrs. Max Marks: 100

PART - A

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

1. Write a note on gross domestic product.
2. Write a note on disguised unemployment.
3. Write a note on Indian agriculture.
4. Write a note on foreign direct investment.
5. Write a note on air transport in India.
6. Write a note on energy crisis in India.

PART – B

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

7. Explain the effects of population growth on Indian economy.
8. Explain the causes of unemployment in India.
9. Explain the concept of sustainable agricultural development.
10. What is SEZ? Explain it role in Indian economic development.
11. Explain the fiscal sector reforms introduced in India.
12. Briefly explain the achievements of economic planning in India.

PART – C

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

13. Explain the main defects of agricultural marketing in India. Point out the measures taken by the government to overcome the defects.
14. Explain the Industrial Sector Reforms in India since 1991.
15. Explain the changing scenario of banking services in India.
16. Explain the government schemes introduced in health sector.

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(2016 Batch onwards)

G 513.6b

Reg. No. :

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER VI – Degree Examination
September - 2020
ECONOMICS – PAPER VIII
ECONOMETRICS

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

PART - A

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

1. Explain the goals of econometrics.
2. Prove that $E(\hat{\beta}_1) = \beta_1$
3. Prove that $R^2 y.X_1X_2 = \frac{\hat{\beta}_1 \sum y_i x_1 + \hat{\beta}_2 \sum y_i x_2}{\sum y_i^2}$
4. Write a note on 'chow test'.
5. Write a note on role of 'Lag' in economics.
6. Write a note on 'Specification Bias'.

PART – B

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

7. What is BLUE? Prove that $E(\hat{\beta}_2) = \beta_2$ as an unbiased estimator.
8. Test the following hypothesis using 'd' statistic and find out the value of Z with 5% significance level from the following table.
   $H_0: P = 0$

   $H_1: P \neq 0$

Output	1	5	4	6
Cost	5	4	7	12

9. Prove that $Var(\hat{\beta}_1) = \sigma_u^2 \frac{\sum x_2^2}{\sum x_1^2 \sum x_2^2 - (\sum x_1 x_2)^2}$
10. Briefly explain the use of dummy variables in seasonal analysis.
11. Explain Koyck's distributed Lag models.
12. Briefly explain indirect least square methods.

PART – C

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

13. Estimate the parameters using OLS and GLS method.
14.

Y	100	75	80	70	50	65	90	100	110	60
X_1	5	7	6	6	8	7	5	4	3	9
X_2	1000	600	1200	500	300	400	1300	1100	1300	300

Find out $\hat{\beta}_1$, $\hat{\beta}_2$, $\hat{\beta}_0$ and R^2 using above table.

Contd...2

15. Test the following hypothesis from the given table.

$H_0: \rho = 0$

$H_1: \rho \neq 0$

Quantity	Price	$\hat{Y}_i$
69	9	63
76	12	72.75
52	6	53.25
56	10	66.25
57	9	63
77	10	66.25
58	7	56.50
55	8	59.75
67	12	72.75
53	6	53.25
72	11	69.50
64	8	59.75

16. Explain Two Stage Least Squares method.

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