(2014 Batch onwards)

G. 501.5a

Reg. No. :

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018
PHYSICS – PAPER V
ATOMIC PHYSICS

Max Marks: 100

Time: 3 hrs.

SECTION –A

(2x10=20)

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

a) Name the two distinct features of vector atom model.

b) State and explain Pauli's exclusion principle.

c) What is the meaning of the symbol $^2D_{5/2}$?

d) Give the expression for Bohr magneton and mention its significance.

e) Give any two properties of a wave function.

f) What are eigen values and eigen functions?

g) Distinguish between a free particle and a particle in a box.

h) What is meant by degeneracy?

i) Mention the applications of pure rotational spectra of a molecule.

j) What is the reason for blue colour of the sky during the day?

k) Distinguish between stokes and anti-stokes lines.

l) Mention two application of Raman effect.

SECTION – B
Answer any <u>TWO</u> full questions from each unit.

UNIT - I

2. a) What are coupling schemes? Explain L-S coupling and j-j coupling in multi-electron systems. **(6)**

b) Explain the drawbacks of Bohr atom model. **(4)**

3. a) Describe with theory the Stern-Gerlach experiment. **(6)**

b) Derive the expression for magnetic dipole moment of electron due to orbital motion. **(4)**

4. a) Obtain the expression for Zeeman shift, using vector atom model. **(6)**

b) Explain the fine structure of sodium D lines. **(4)**

UNIT – II

5. a) Describe briefly, Davison-Germer experiment and analyze the results obtained in support of de-Broglie hypothesis of matter waves. **(6)**

b) State Heisenberg's uncertainty principle. Explain the three uncertainty Relations. **(4)**

6. a) Set up the time dependent Schrodinger wave equation. **(6)**

   b) What are matter waves? Obtain the expression for de-broglie wavelength. **(4)**

7. a) Using Schrodinger wave equation for particle in a linear potential box of infinite height, obtain the eigen values and eigen functions. **(6)**

   b) Based on the uncertainty principle, account for the finite width of spectral lines. **(4)**

UNIT - III

8. a) Assuming a diatomic molecule to be a rigid rotator as well as a harmonic oscillator, derive the expression for wave number of spectral lines. **(6)**

   b) Explain the characteristics of Raman spectrum. **(4)**

9. a) Describe the Millikan's oil drop method to determine the charge on the electron. **(6)**

   b) Discuss the quantum theory of Raman effect. **(4)**

10. a) Derive the expression for the change in wavelength in Compton scattering. **(6)**

    b) Obtain the expression for rotational energy of a diatomic molecule. **(4)**

SECTION –C
Answer any <u>FOUR</u> of the following.   **(4x5=20)**

11. Calculate the energy separation between the two sub-states formed due to spin-orbit coupling in hydrogen atom, if the magnetic field experienced by electron due to orbital motion is 12.58T.

    Planck's constant $h=6.63 \times 10^{-34} Js$, mass of the electron $=9.1 \times 10^{-31}$ Kg and charge on the electron $= 1.6 \times 10^{-19} C$.

12. Calculate the magnetic field strength required to produce a normal Zeeman effect of 0.05nm of the line of wavelength 600nm if $\frac{e}{m}$ of electron is $1.76 \times 10^{11} C/Kg$.

13. The de-Broglie wavelength of an electron is 0.073nm.

    Calculate its (i) velocity and (ii) the potential difference used to accelerate it. Given $h=6.62 \times 10^{-34}$ Js. $m_e=9.1 \times 10^{-31} Kg$ and $e=1.6 \times 10^{-19} C$.

14. A proton is confined to a nucleus of radius $5 \times 10^{-15} m$. Calculate the uncertainty in (i) linear momentum and (ii) kinetic energy.
    Given $m_p=1.67 \times 10^{-27}$ Kg.

15. The force constant of CO bond is 150Nm^{-1}. Find the frequency of CO molecule and spacing between the vibrational levels.

16. Photon of energy 1.02 MeV undergoes Compton scattering through 180°. Calculate the energy of the scattered photon.

    Compton wavelength $=0.0243 \overset{o}{A}$.

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(2014 Batch onwards)

G. 501.5b

Reg. No. : ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V– Degree Examination
October - 2018
PHYSICS – PAPER VI
SOLID STATE PHYSICS

Time: 3 hrs.   Max Marks: 100

SECTION –A

(2x10=20)

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

a) Explain Bose-Einstein distribution law.

b) Define Einstein temperature.

c) Define relaxation time and mean free path.

d) Give the expression for the electrical conductivity of solids.

e) What is Hall effect?

f) Define Fermi energy at absolute zero and write the expression for it.

g) Distinguish between semiconductor and insulator.

h) What are intrinsic and extrinsic semiconductors?

i) What is a unit cell?

j) What is glass transition temperature?

k) State Duane-Hunt law in X-rays.

l) What is polar dielectric material?

SECTION – B
Answer any TWO full questions from each unit.
UNIT - I

2. a) Explain the three distribution laws used in physics. Show that at low densities, the quantum statistics reduce to classical statistics. **(6)**

b) Explain Boltzmann tail. **(4)**

3. a) Explain Debye's theory of specific heat of solids. **(6)**

b) Give the limitations of Dulong-Petit law. **(4)**

4. a) Obtain an expression for the electrical conductivity of a metal using classical free electron theory and hence arrive at ohm's law. **(6)**

b) Explain Lorentz-Drude model of a solid. **(4)**

UNIT - II

5. a) What is the significance of Hall coefficient? With necessary circuit, explain how Hall coefficient is measured. **(6)**

b) Explain the Somerfield's model of a solid. **(4)**

6. a) Obtain an expression for the electrical conductivity of an intrinsic semiconductor and discuss the variation of resistance with temperature. **(6)**

b) What are intrinsic semiconductors? Give their properties. **(4)**

G. 501.5b

7. a) Explain the band formation in solids with an example. (6)

   b) Explain p-type semiconductor. (4)

UNIT - III

8. a) Explain how Miller indices are obtained for a crystal plane. (6)

   b) Discuss simple cubic and bcc crystal system with examples. (4)

9. a) State Bragg's law and explain Bragg's spectrometer. (6)

   b) What are continuous and characteristic X-rays? (4)

10. a) Explain B-H curve of ferromagnetic material. (6)

   b) Distinguish between the diamagnetic, paramagnetic and ferromagnetic materials. (4)

SECTION -C

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

11. Velocities of longitudinal and transverse waves in a solid are 6370 ms^{-1} and 3110 ms^{-1} respectively. Calculate Debye frequency for the solid. ($N=6.02 \times 10^{26}$/m^3).

12. Assume that each copper atom contributes one electron to the free electron gas. If the conductivity of copper = 6×10^5 mho/cm, its atomic weight 63.54 and density = 8.96 gm/cc. Calculate the average speed of the electron at 27°C and mean free path.

13. Calculate the average energy of an electron at absolute zero in sodium metal assuming one free electron per atom.
Molecular weight of sodium = 23 and its density = 970 kgm^{-3}.

14. Resistance of an intrinsic semiconductor at 30°C is 260Ω and at 100°C is 20 Ω. Calculate the energy gap.

15. Monochromatic X-rays of wavelength 5Å are diffracted at an angle of 5° in the first order. What is the spacing between the adjacent planes of the crystal? At what angle will second maximum be seen?

16. A magnetic material has a magnetization of 3300 A/m and a flux density of 0.0044T. Calculate the magnetizing field and the relative permeability of the material.

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(2014 Batch onwards)

G 502.5a

Reg. No: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

CHEMISTRY- PAPER V

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 <u>TEN</u> of the following questions in 1 to 3 sentences   (2×10=20)

1. a) Define molal boiling point elevation constant.

   b) State Raoult's law.

   c) Give any two limitations of Nernst distribution law.

   d) Name any two types of nanomaterials with examples.

   e) What is a redox couple? Give an example.

   f) What is a Pourbaix diagram?

   g) Give the selection rules for electronic transitions.

   h) What is bathochromic shift? Give an example.

   i) Give an example of Chichibabin reaction.

   j) What is the product obtained when thiophene is nitrated? Give the equation.

   k) Pyridine is less basic than piperidine. Give reason.

   l) Mention the role of Calcium in biological system.

PART – B

Answer any <u>TEN</u> of the following questions in 2 to 5 sentences   (3×10=30)

2. i) Show that relative lowering of vapour pressure is equal to the molefraction of the solute.

   ii) Discuss a system which shows negative deviation from Raoult's law.

   iii) Explain the miscibility temperature – composition diagram of phenol-water system.

   iv) Mention the advantages of using nanomaterials.

   v) Explain the decomposition of NH_2OH using Frost diagram.

   vi) Discuss the Redox stability in water.

   vii) Explain the complexation reaction involved in the extraction of nickel by Mond's process.

   viii) What are chromophores and auxochromes? Give examples.

G 502.5a

   ix)   Give any two methods of synthesis of Pyrrole.

   x)   Give the Hantzsch synthesis of pyridine.

   xi)   Explain Fischer-Indole synthesis.

   xii)   Explain Bohr effect.

PART - C

(5×10=50)

Answer any <u>TEN</u> of the following questions

3. Explain the determination of molecular mass of a solute by Walker-Lumsden method.

4. Derive the thermodynamic relation between freezing point depression and molecular mass of the solute.

5. Explain the effect of association and dissociation on Nernst distribution law.

6. Give any two methods of synthesis of carbon nano particles.

7. Explain Latimer diagram for chlorine.

8. Convert following Latimer diagram into Frost diagram.

$$O_2 \xrightarrow{\text{0.70V}} H_2O_2 \xrightarrow{\text{1.76V}} H_2O$$

9. Discuss the significance of complexation reaction in gravimetric estimations of nickel and magnesium.

10. Explain the electronic band spectra on the basis of potential energy curves.

11. Explain Bischler – Napieralski synthesis of isoquinoline.

12. Write the general mechanism for electrophilic substitution of furan. Give one example for nitration of furan.

13. Explain why electrophilic substitution in quinoline takes place at position 5 and 8. Give the equation for sulphonation of quinoline.

14. Explain the Na^+/K^+ pump.

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(2014 Batch onwards)

G 502.5b

Reg. No: ☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

CHEMISTRY- PAPER VI

Max. Marks: 100

Time: 3 Hours

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

PART – A

Answer any **TEN** of the following questions in 1 to 3 sentences   (2×10=20)

1. a) What is black body?

   b) Explain Hamiltonian operator.

   c) Homo nuclear diatomic molecules are microwave inactive. Give reason.

   d) Explain the selection rule for rotational transition.

   e) Calculate the spin only magnetic moment of Fe^{2+} ion.

   f) Define Curie temperature and Neel temperature.

   g) Calculate the ground term for d^9 system.

   h) How are phosphazenes prepared?

   i) What are oligosaccharides? Give one example.

   j) What is glycosidic linkage?

   k) What is re-naturation of proteins?

   l) What is meant by isoelectric point?

PART – B

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

(3×10=30)

2. i) Explain Planck's radiation law.

   ii) What is Compton effect? Explain.

   iii) Show that the successive lines are separated by 2B in pure rotational spectra.

   iv) Pure rotational spectrum of HCl consists of a series of lines separated by $21 \times 10^2 m^{-1}$. Calculate the H-Cl bond length. Reduced mass of HCl is 1.623×10^{-27} Kg.

   v) Discuss the variation of magnetic susceptibility with temperature for paramagnetic and ferromagnetic substances.

   vi) Give the relationship between μ_s and $\mu_{effective}$. Explain the terms.

   vii) What are the two types of selection rules in d-d transition?

   viii) Explain the structure of boron nitride.

   ix) How do you convert glucose into fructose?

   x) Explain the mechanism of mutarotation.

xi) Explain Gabriel phthalimide synthesis of an amino acid.

xii) Describe the fragmentation pattern of ethanol.

PART - C

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

3. What are the postulates of quantum mechanics?

4. Write the Schrödinger wave equation and explain the terms involved in it. What is meant by Eigen value and Eigen functions?

5. Derive an expression for the moment of inertia of a diatomic molecule as rigid rotor.

6. Write note on intensity of spectral lines in rotational spectra.

7. Explain the experimental procedure for the determination of magnetic susceptibility of complex by Gouy's method.

8. Explain the different magnetic properties of complexes with example.

9. Explain the electronic spectrum of $[Ti(H_2O)_6]^{3+}$ complex ion.

10. Explain the preparation of linear silicones. Give the applications of silicones

11. Describe one method for chain lengthening and chain shortening of monosaccharides.

12. Explain the mechanism of osazone formation.

13. Describe the different levels of structure of proteins.

14. Explain McLafferty rearrangement with suitable example.

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(2014 Batch onwards)

G 503.5a   Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

MATHEMATICS – PAPER V
Algebra and Differential Equations

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

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

1. Prove that a field is an integral domain.

2. If p is a prime then prove that J_p is a field.

3. Prove that kernel of a homomorphism is an ideal.

4. For a non unit $a+ib$ in the ring of Gaussian integers, prove that $a^2+b^2>1$.

5. Prove that Euclidean ring possesses a unit element.

6. Test whether x^2+1 is irreducible over the ring of integers modulo 7.

7. Find the particular integral for the differential equation $D^2(D-1)^3(D+1)y=e^x$.

8. Solve $(D^2+16)y=14\cos 4x$.

9. Solve $(D^3-D)y=x$.

10. Solve $x^2\dfrac{d^2y}{dx^2}+x\dfrac{dy}{dx}-3y=x^2$.

11. Transform $(x+a)^2\dfrac{d^2y}{dx^2}-4(x+a)\dfrac{dy}{dx}+6y=x$ into a differential equation with

    constant coefficients by putting $z=x+a$ and $u=\log z$.

12. Find A in the method of variation of parameters to solve $(D^2+1)y=\sec x$ if

    $y=A\cos x+B\sin x$.

13. Find $L\left\{\dfrac{1-e^{-t}}{t}\right\}$.

14. Show that $L\{\cosh\ kt\}=\dfrac{s}{s^2-k^2}$, $s>|k|$.

15. Evaluate $L^{-1}\left\{\dfrac{s}{s^2+8s+16}\right\}$.

PART – B

UNIT - I

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

1. If $x^2=x$ for all x in a ring R, prove that R is commutative.

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2. Prove that finite integral domain is a field.

3. Let R be a commutative ring with unit element whose only ideals are $\{0\}$ and R. Prove that R is a field.

4. Let ϕ be a homomorphism of fields. Prove that ϕ is either an isomorphism or maps entire F to '0'.

5. If U be an ideal of R and $r(U) = \{x \in R \mid xu = 0 \ \forall u \in U\}$. Prove that $r(U)$ is an ideal of R.

UNIT – II

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

1. Define a maximal ideal. Prove that $A = (a_0)$ is a maximal ideal in a Euclidean ring R if and only if a_0 is a prime element in R.

2. Let R be a Euclidean ring and $a, b \in R$. If $b \neq 0$ is a non unit in R then prove that $d(a) < d(ab)$.

3. Prove that in a Euclidean domain R an element 'a' is a unit if and only if $d(a) = d(1)$.

4. If p is a prime number of the form $4n+1$, then prove that $p = a^2 + b^2$, $a, b \in Z$.

5. Prove that in a polynomial ring deg $(f(x) . g(x)) = \deg f(x) + \deg g(x)$.

UNIT – III

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

1. Solve: $(D^2 + 1) y = \sinh(2x)$.

2. Solve: $D(D-2)^2 y = e^{2x}$.

3. Solve: $(D^2 - D - 2) y = 6x + 6e^{-x}$.

4. Solve: $y'' + 4y = 4\sin^2 x$.

5. Solve: $(D^3 - 7D - 6) y = e^{2x}(1+x)$.

UNIT – IV

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

1. Solve $(2x-1)^3 \dfrac{d^3 y}{dx^3} + (2x-1)\dfrac{dy}{dx} - 2y = 0$.

2. Solve $x^3 \dfrac{d^3 y}{dx^3} + 3x^2 \dfrac{d^2 y}{dx^2} + x\dfrac{dy}{dx} + y = \sin \log x$.

3. Solve the differential equation $(D^2 + 1) y = \operatorname{cosec} x$ by the method of reduction of order.

4. Solve the differential equation $(D^2 + 1) y = \tan^2 x$ by variation of parameters.

5. Solve the differential equation $\cos x \dfrac{d^2 y}{dx^2} + \sin x \dfrac{dy}{dx} - 2y \cos^3 x = 2\cos^5 x$ by the method of change of independent variable.

UNIT - V

(3×5=15)

Answer any **THREE** questions

1. Find $L\{F(t, c)\}$ where $F(t, c) = \begin{cases} t & 0 \leq t \leq c \\ 2c - t & c \leq t \leq 2c \end{cases}$ and $F(t + 2c, c) = F(t, c)$.

2. Find $L\{t \cos^2 t\}$ and $L^{-1}\left\{\dfrac{s+1}{s^2 + 6s + 25}\right\}$.

3. Using Laplace transforms solve the differential equation $x''(t) + 4x'(t) + 4 x(t) = 4e^{-2t}$.

4. Using Laplace transforms solve the differential equation

    $x''(t) + x(t) = 6 \cos 2t, \quad x(0) = 3 \quad x'(0) = 1..$

5. A spring is such that a 5 pound weight stretches it 6 inches. The 5 pound weight is attached. The weight is pulled down 3 inches below equilibrium and started off with an upward velocity of 6 feet/sec. Find an equation giving the position of the weight.

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(2014 Batch Onwards)

G 503.5b(i)   Reg. No. : ☐☐☐☐☐☐

St. Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018
MATHEMATICS – Paper VI
DISCRETE MATHEMATICS

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

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

1. If $A = \{p, q, r\}$ write $P(A)$. Also find $|P(A)|$.

2. Define partially ordered set and give an example.

3. Define a lattice and give an example.

4. Prove that a cutest and any spanning tree must have at least one edge in common.

5. Draw complete graphs K_n for $n \leq 5$.

6. Define the terms rank and nullity of a graph. What is the rank of a connected graph of 12 vertices?

7. Define the terms (i) Fundamental circuit
                        (ii) Fundamental cutest

8. Draw any three spanning trees of the following graph.
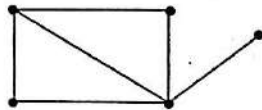
9. Obtain a binary tree for the prefix code $\{1, 01, 000, 001\}$.

10. Give an abstract model of a finite state machine.

11. Write in tabular form the design of a modulo 3 sum of the digits $0, 1, 2$, in the input signals.

12. State the algorithm *LARGEST* 1.

13. Find the homogeneous solution of the difference equation $a_r - 5a_{r-1} + 6a_{r-2} = 1$.

14. Show that $a = \alpha_0 + \alpha_1 r + \alpha_2 r^2 + \cdots + \alpha_n r^n$ is $O(r^n)$.

15. Write the generating function for the numeric function $a_r = 3^{r+2}, r \geq 0$.

PART – B
UNIT - I

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

1. Give an example of a countably infinite set. Show that the set of all real numbers 0 and 1 is not a countably infinite set.

2. If the length of the longest chain in a partially ordered set $(P, \leq)$ is $'n'$. then show that the elements in P can be partitioned into $'n'$ disjoint antichains.

3. If no three diagonals of a convex decagon meet at the same point inside the decagon, into how many line segments are the diagonals divided by their intersections?

4. Show that any integer composed of 3^n identical digits is divisible by 3^n.

5. Explain the phrase structure grammar with examples.

UNIT – II

Answer any <u>THREE</u> of the following.   **(3×5=15)**

1. With the usual notation prove that $v - e + r = 2$ for any connected planar graph.

2. Prove that there is always a Hamiltonian path in a directed complete graph.

3. In a directed or undirected graph with n vertices, if there is a path from the vertex V_1 to the vertex V_2, then prove that there is a path of no more than $(n - 1)$ edges from the vertex V_1 to vertex V_2.

4. Define 'Eulerian path' and 'Hamiltonian path'. Trace an Eulerian circuit and a Hamiltonian circuit in the following graph.
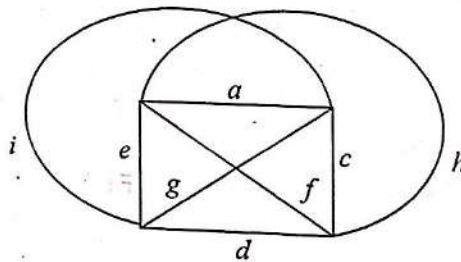
5. Prove that an undirected graph possesses an Eulerian path if and only if it is connected and has either 0 or 2 vertices of odd degree.

UNIT – III

Answer any <u>THREE</u> of the following.   **(3×5=15)**

1. Prove that a graph with $e = v - 1$ edges that has no circuit is a tree.

2. Prove that in any tree the number of vertices is one more than the number of edges.

3. Show that in a connected graph, every circuit has an even number of edges in common with every cutset.

4. Define a prefix code. Construct a prefix code for the following alphabet given the respective occurrences.

Letter	a	b	c	d	e
Occurrences	12	3	6	4	5

5. Describe an algorithm for determining a minimum spanning tree of a connected weighted graph.

UNIT – IV

Answer any <u>TWO</u> of the following. (2× 7½==15)

1. State the algorithm BUBBLESORT. Justify it with the formal proof and find it's time complexity.

2. Define finite state language. Prove that the language $L = \{a^k : K=i^2, i \geq 1\}$ is not a finite state language.

3. When are the two states said to be k - equivalent? Illustrate with example.

4. Let L be the finite state language accepted by a finite state machine with N states. For any sequence α whose length is N or larger in the language, prove that α can be written as uvw such that v is non empty and uv^iw is also in the language for $i \geq 0$ where v^i denotes the concatenation of i copies of the sequence v.

UNIT – V

Answer any <u>THREE</u> of the following. (3×5=15)

1. Find the particular solution of the difference equation,
$a_r + 5a_{r-1} + 6a_{r-2} = 3r^2$.

2. Find the homogeneous solution of the difference equation
$a_r + 6a_{r-1} + 12a_{r-2} + 8a_{r-3} = 0$.

3. Write the difference equation of the Fibonacci sequence and find its solutions.

4. Find the numeric function for the generating function $A(Z) = \frac{2+3Z-6Z^2}{1-2Z}$.

5. Obtain the numeric function $q * b$, where $q_r = 3^r$, $r \geq 0$ and $b_r = 2^r, r \geq 0$.

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9

G. 503.5b (iii)

(2014 batch onwards)
Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October 2018
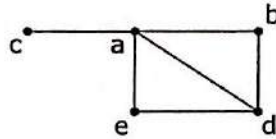### MATHEMATICS-PAPER VI
Graph Theory
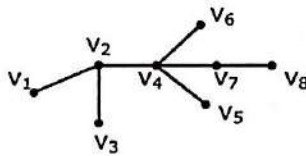
Time: 3 Hours

Max. Marks: 100

PART –A

Answer any TEN of the following.

(10×2½=25)

1. Prove that the number of odd degree vertices in a graph is always even.

2. Define the terms i) Pendant vertex ii) Binary Tree.

3. Define the terms a) Hamiltonian circuit b) walk in a graph.

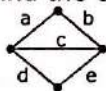4. Draw the graph obtained by fusing the vertices a and b in the graph.

5. Using Euler's formula for number of regions in a planar graph prove that $e \leq 3n - 6$.

6. Find the eccentricities of the vertices of the following graph $\{v_1, v_5\}$.

7. Draw the graph associated with the incidence matrix.

$$\begin{array}{c} \\ v_1 \\ v_2 \\ v_3 \end{array} \begin{array}{cc} a & b \\ \begin{bmatrix} 1 & 0 \\ 1 & 1 \\ 0 & 1 \end{bmatrix} \end{array}$$

8. Find the circuit matrix of the graph.

9. Write the geometric dual of the graph
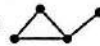
10. Find the chromatic number of the graph
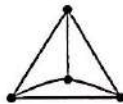
11. Find the number of ways of coloring a binary tree with two pendant vertices using 5 colors.

12. Define the terms i) proper coloring and ii) Chromatic number.

13. Define symmetric and asymmetric digraphs.

14. Prove that number of simple labeled graph of n vertices is $2^{\frac{n(n-1)}{2}}$

15. Draw an Arborescence with 5 vertices.

Contd...2

PART-B
Unit-I

(3×5=15)

Answer any THREE of the following.

1. Prove that a graph is a tree if and only if it is minimally connected.

2. Prove that a tree can have atmost two centres.

3. Prove that a connected graph is an Euler graph if and only if all vertices of G are of even degree.

4. List all the fundamental circuits with respect to spanning tree { a, b, c, d, e, f} in the graph.

5. Define distance between the vertices of a graph. Show that distance between the vertices in a connected graph is a metric.
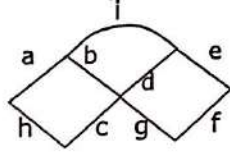
Unit II

(3 x5=15)

Answer any THREE of the following.

1. In a connected planar graph with n vertices and e edges, prove that there are e-n+2 regions.

2. Prove that Kuratowski's graph K_5 has no dual.

3. Prove that in a graph every circuit has even number of edges common with any cutset.

4. Prove that in a connected graph G, a minimal set of edges containing at least one branch of every spanning tree is cutset.

5. Prove that a graph is planar if and only if it can be embedded on a sphere.

Unit III

(3 x5=15)

Answer any THREE of the following.

1. Prove that the rank of the circuit matrix of a connected graph with 'n' vertices and 'e' edges is e-n+1.

2. Prove that ring sum of two circuits in graph G is either a circuit or an edge disjoint union of circuits.

3. If B and A are the circuit matrix and the incidence matrix of a self loop free graph whose columns are arranged using the same order of edges, then prove that $A.B^T \equiv 0 \pmod 2$.

4. Write the adjacency matrix of the following graph.
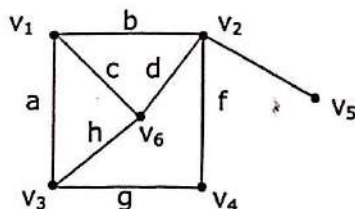
5. Prove that the rank of the incidence matrix of a connected graph with n vertices is n-1.

G. 503.5b (iii)

Unit IV

Answer any THREE of the following. . $\qquad$ (3 x5=15)

1. Prove that every tree with two or three vertices is 2 chromatic.

2. Prove that chromatic polynomial of a tree with n vertices is $P_n(\lambda) = \lambda (\lambda-1)^{n-1}$.

3. Prove that a graph on n vertices is a complete graph if and only if its chromatic polynomial is $P_n(\lambda) = \lambda (\lambda-1) \ldots\ldots(\lambda-n+1)$.

4. Let a and b be two non-adjacent vertices in a graph G. Let G' be a graph obtained by adding an edge between a and b. Let G'' be a simple graph obtained from G by fusing the vertices a and b together and replacing sets of parallel edges with a single edge.

   Prove that $P_n(\lambda)$ of $G = P_n(\lambda)$ of $G' + P_{n-1}(\lambda)$ of G''.

5. Find the chromatic polynomial of the following graph.
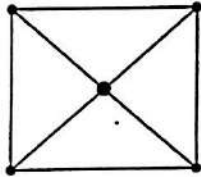
Unit V

Answer any THREE of the following. $\qquad$ (3 x5=15)

1. Show that the determinant of every square sub matrix of the incidence matrix of a diagraph is 1, -1 or 0.

2. Prove that an arborescence is a tree in which every vertex other than the root has an in degree of exactly one.

3. Explain the method of construction of directed Euler line in an Euler digraph G.

4. Prove that a diagraph is an Euler diagraph if and only if G is connected and balanced.

5. Prove that there are n^{n-2} labelled trees with n vertices. (n≥2).

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(2007 batch onwards)

G 503.5b(iv)   Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October- 2018
MATHEMATICS – Paper VI
LINEAR PROGRAMMING

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

I   Answer any TEN of the following. $(10 \times 2\frac{1}{2}=25)$

1. Define i) a convex set in R^n ii) hyperplane in R^n.

2. Pivot on $a_{22} = 5$ in the following maximization table :

x	y	-1	
1	2	3	$= -t_1$
4	5	6	$= -t_2$
7	8	9	$= f$

3. State the canonical maximum problem given by the following table :

x	y	-1	
2	3	6	$= -t_1$
1	3	2	$= -t_2$
0	2	1	$= f$

4. Write the negative transpose of the minimum table :

x	1	4	7
y	2	5	8
-1	3	6	9
	$= s_1$	$= s_2$	$= g$

5. Write the matrix reformulation of canonical maximization LPP.

6. Given the LPP below :

    Maximize $f(x_1, x_2) = x_1 + 2x_2$,

    subject to $x_1 - x_2 \leq 0$,

    $\quad\quad -x_1 + x_2 \leq -1, \quad\quad x_1, x_2 \geq 0.$

    State the dual canonical minimization LPP.

7. Reduce the following table of the matrix game using domination :

$$\begin{bmatrix} 2 & 1 & 4 & 2 \\ 1 & 2 & 1 & 1 \\ -2 & 6 & 3 & -2 \\ 3 & -3 & 5 & 1 \\ 1 & -2 & 2 & 1 \end{bmatrix}$$

G 503.5b(iv)

8. Define mixed strategy and pure strategy for a row player of a matrix game.

9. State duality theorem.

10. Define cycle in a balanced transportation problem.

11. Apply the first step of Hungarian algorithm to the assignment problem:

0.5	2	1
1.2	$\frac{1}{6}$	7
$\frac{5}{9}$	0	3.14

12. Find all permutation set of zero's in the following table of balanced assignment problem:

0	0	1
0	0	0
1	0	0

13. Prove that any flow in a capacited directed network satisfies $\sum_j \phi_j(v) = 0$

14. Define a path and a cycle in a directed network.

15. Define a cut, cutest and capacity of a cut in a capacited directed network.

PART – B
UNIT - I

Answer any TWO questions. $(2 \times 7\frac{1}{2} = 15)$

1. An oil company owns two refineries; say Refinery A and Refinery B. Refinery A is capable of producing 20 barrels of gasoline and 25 barrels of fuel oil per day. Refinery B is capable of producing 40 barrels of gasoline and 20 barrels of fuel oil per day. The company requires at least 1,000 barrels of gasoline and at least 800 barrels of fuel oil. If it costs \$ 300 per day to operate refinery A and \$ 500 per day to operate refinery B, how many days should each refinery be operated by the company so as to minimize costs? Solve graphically.

2. State the complete simplex algorithm for maximum table.

3. Apply Simplex algorithm to the following maximum table :

x	y	-1	
2	1	8	$= -t_1$
1	2	10	$= -t_2$
30	50	0	$= f$

4. Apply simplex algorithm to the maximum table:

	x	y	-1	
	1	-1	3	$= t_1$
	-2	1	2	$= t_2$
	2	-1	0	$= f$

UNIT - II

Answer any TWO questions. $(2 \times 7\frac{1}{2} = 15)$

1. Solve the following minimization LPP using the simplex algorithm :

x	-1	-1	-1
y	-1	1	-1
-1	-2	1	0
	$= +t_1$	$= +t_2$	$= g$

2. Prove that a pair of feasible solutions of dual canonical LPP exhibit complementary slackness if and only if they are optimal solutions.

3. Solve the dual non-canonical LPP :

   Maximize $f(x, y, z) = x + y + z$ subject to $x + y + z = 6$, $x + y \leq 1$, $x, z \geq 0$.

4. Solve the dual canonical LPP :

	x_1	x_2	-1	
y_1	1	-1	-1	$= -t_1$
y_2	-1	-1	-1	$= -t_2$
-1	1	-2	0	$= f$
	$= s_1$	$= s_2$	$= g$	

UNIT - III

Answer any TWO questions $(2 \times 7\frac{1}{2} = 15)$

1. Solve the dual canonical LPP:

	x_1	x_2	-1	
y_1	-1	1	-1	$= -t_1$
y_2	1	-1	-1	$= -t_2$
-1	1	1	0	$= f$
	$= s_1$	$= s_2$	$= g$	

2. Solve the dual non-cannonical L.P.P :

	x_1	x_2	x_3	-1	
y_1	0	-1	-1	-1	= 0
y_2	-1	-3	4	0	= $-t_1$
y_3	-1	2	-3	0	= $-t_2$
-1	-1	0	0	0	= f
	= 0	= s_1	= s_2	= g	

3. Solve the dual non-canonical LPP

	x_1	x_2	-1	
y_1	2	-1	-1	= -0
y_2	-1	1	-1	= $-t_1$
-1	2	1	0	= f
	= 0	= s_2	= g	

4. Find the optimal strategies for the row and column palyers and the Von-Newmann value of the matrix game with pay off matrix.

$$\begin{bmatrix} -5/3 & 0 \\ 5 & -10/3 \end{bmatrix}$$

UNIT – IV

Answer any TWO questions $(2 \times 7\frac{1}{2} = 15)$

1. State the transportation algorithm in solving a balanced transportation problem.

2. Solve the transportation problem below:

8	2	3	7	42
9	4	5	6	17
7	1	6	5	17
9	14	24	29	

3. State the Hungarian algorithm in solving a balanced assignment problem.

4. Solve the assignment problem given below:

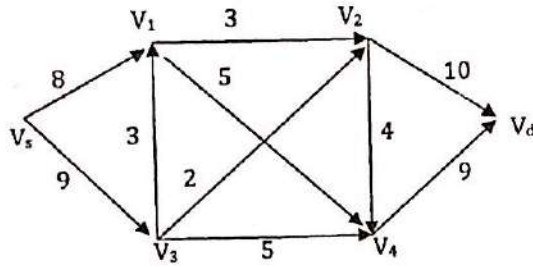| 2	3	2	4
5	8	4	3
5	9	5	2
7	6	7	4

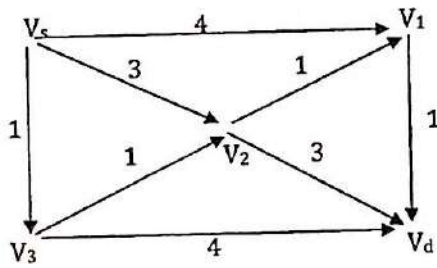G 503.5b(iv)

Page No.5

UNIT - V

Answer any TWO questions

(2×7½=15)

1. State the Maximal flow algorithm.

2. State the maximal flow network problem :

3. State the Dijkstra's algorithm for finding the shortest path.

4. Solve the shortest – path problem below. Give both the shortest path and path value:

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(2015 batch Onwards)

G 504.5a

Reg. No. ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester V – Degree Examination
October - 2018

ELECTRONICS – PAPER V
ELECTRONIC COMMUNICATION SYSTEMS

Time: 3 hrs.   Max Marks: 100

Note: This question paper consists of 3 sections. Section A , Section B and Section C. Answer all the Sections

SECTION – A

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

 i) The frame repetition frequency in interlaced scanning of CCIR-B standard TV communication is ....

    a) 25Hz   b) 50Hz   c) 60Hz   d) 100Hz

 ii) The advantage of negative modulation in TV communication is,.........

    a) reduction in Noise   b) to increase brightness
    c) to increase transmission power   d) to decrease the scanning rate

 iii) The amount of light intensity given out by the color irrespective of that color is called ....

    a) Luminance   b) Hue   c) Saturation   d) Porch

 iv) .... is an example for an indirect band gap material.

    a) GaAs   b) GaP   c) Si   d) GaAsP

 v) .... converts optical power to electric current.

    a) Optical source   b) Optical detector
    c) Optical isolator   d) Optical coupler

 vi) .... dispersion gives rise to pulse spreading in single mode fiber.

    a) intra model   b) inter modal   c) material   d) group velocity.

 vii) .... multiplexing scheme is used in GSM system.

    a) TDMA   b) FDMA   c) CDMA   d) FDMA+TDMA

 viii) A PWM signal can be generated by ....

    a) an astable multivibrator   b) a monostable multivibrator
    c) integrating PPM signal   d) Differentiating PPM Signal

 ix) The sequence of operations in PCM is ....

    a) Sampling, Encoding, Quantizing   b) Sampling, Quantizing, Encoding
    c) Quantizing, Sampling, Encoding   d) Sampling, Quantizing, Decoding

 x) .... is a universally adopted shape of a cell in mobile communication.

    a) Square   b) Circle   c) Triangle   d) Hexagon

 xi) The duplex distance between uplink and downlink frequencies in GSM900 system is............

    a) 15MHz   b) 25MHz   c) 45MHz   d) 65MHz

 xii) The equipment needed to allow the home computer to connect to the internet is...........

    a) hub   b) gateway   c) modem   d) monitor

2. **Answer any TEN of the following.**   (10x1=10)

i)   What is meant by VSB transmission?

ii)   Expand the term 'NTSC'.

iii) What type of deflecting system is used in picture tube?

iv)   Mention one application of a LASER.

v)   Define a 'Splicer' in optical fiber communication link.

vi)   Define 'quantum efficiency' with respect to optical source.

vii) Define Nyquist's sampling theorem?

viii) Mention one difference between FDMA and TDMA.

ix)   What are PN codes?

x)   Why is 'cell splitting' technique used in mobile communication?

xi)   Mention the function of Visitors Location Register(VLR) in GSM system.

xii) What do you mean by 'WWW'?

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

i)   Write a note on Domains.

ii)   Write a note on 'frequency reuse'.

iii) What do you mean by "hand off" in mobile communication?

iv)   Differentiate between PAM and PCM.

v)   Draw the block diagram of FHSS.

vi)   What do you mean by "companding"?

vii) Define 'attenuation' in fibers and hence give the equation.

viii) Explain the key principle of operation of laser diode.

ix)   Explain an 'optocoupler'.

x)   Mention the differences between CRT and monochrome TV picture tube.

xi)   Write a note on subtractive colour mixing.

xii) Calculate the wavelength of light emitted from LED, Which uses a semiconductor material of energy gap 1.8eV.

SECTION B

4 **Answer any SEVEN of the following.**   (7X4=28)

i)   With a diagram explain a colour camera tube.

ii)   For a TV channel lying in the frequency band (54-61)MHz, Draw the frequency spectrum diagram and find

   i)PC   ii)SC   iii)Sound IF   iv)Picture IF

iii) Write a note on Solar cell.

iv)   A Given optical fiber has core refractive index=1.5 and the cladding refractive index=1.45. Calculate NA and θ_{0max}.

v)   With diagram explain a PIN diode photodetector.

vi)   With necessary diagram explain the production of PWM signal.

vii)   Explain TDMA technique.

viii) Explain any two mobile identities.

ix)   Write a note on internet search engines.

x)   With block diagram explain the incoming call in GSM.

SECTION C

Answer any <u>THREE</u> full questions.   **(3x10=30)**

5.a)   With necessary diagram explain a Plumbicon camera tube.   **(6)**

  b)   With necessary diagram explain 'interlaced scanning'.   **(4)**

6.a)   Define 'Responsivity' and 'Quantum Efficiency' of a Photo detector and   **(6)**
       derive the relationship between them.

  b)   With block diagram explain an optical fiber communication link.   **(4)**

7.a)   With a diagram explain the production of PPM signal   **(6)**

  b)   With necessary diagram explain frequency division multiplexing.   **(4)**

8.a)   With block diagram explain GSM architecture.   **(6)**

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

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(2015 Batch onwards)

G 504.5b   Reg. No. ☐ ☐ ☐ ☐ ☐ ☐

St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

October - 2018

ELECTRONICS – PAPER VI

8085 Microprocessor and 8051 Microcontroller

Note: This question paper has three sections. Section A, Section B and Section c. Answer all the 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) After execution of the instruction **SBI, 8 bit data**, in 8085 microprocessor the result is placed in _____ register.
      a) B   b) C   c) E   d) A

   ii) **MVIA, 18H** in $8085\mu P$ is _____ byte instruction.
      a) 3   b) 2   c) 1   d) 4

   iii) **DAD D** instruction of 8085 processor adds the contents of _____ registers.
      a) HL and BC   b) HL and HL   c) HL and SP   d) HL and DE

   iv) The size of internal RAM of 8051 microcontroller is _____
      a) 128 bytes   b) 4 k bytes   c) 512 bytes   d) 256 bytes

   v) In indirect addressing mode of 8051 controller _____ registers are used to hold the address of RAM memory.
      a) R_3 and R_5 b) R_2 and R_0 c) R_0 and R_1 d) R_4 and R_6

   vi) 8051 μC has _____ timers.
      a) 2   b) 5   c) 4   d) 1

   vii) _____ instruction is invalid in 8051 μC.
      a) PUSH R_3 b) MOV 50,@R_0 c) PUSH 05   d) MOV R_0, R_7

   viii) If clock frequency of 8051 μC is 12 MHz, then one machine cycle is _____
      a) $1\mu S$ b) $0.01\mu S$ c) 0.1ms   d) 0.01ms

   ix) 8051 controller has _____ interrupts.
      a) 4   b) 5   c) 3   d) 7

   x) _____ of 8051 controller does not have dual functions.
      a) port 0   b) port 1   c) port 2   d) port 3

   xi) _____ register of 8051 μC is 16 bit
      a) A   b) SP   c) PSW   d) PC

   xii) In 8051 μC by default SP points to _____ location.
      a) 07h   b) 08h   c) 06h   d) 09h

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

   i) Write any one 8085 instruction to clear the content of Accumulator.

G 504.5b

ii) Which interrupt of 8085 μP has the highest priority?

iii) Give any one example to immediate addressing mode in 8085 μP.

iv) Give an example for bit addressable SFR in 8051 μC.

v) Which type of addressing mode is used to access the stack in 8051 μC?

vi) Mention one use of counters in 8051 μC.

vii) With example explain INC DPTR instruction of 8051 μC.

viii) Write the role of program counter in 8085 μP

ix) Mention the registers of 8051 μC used during the execution of MUL instruction.

x) Mention the difference between ACALL and LCALL instruction in 8051 μC.

xi) Write the syntax of DJNZ instruction.

xii) Mention any one difference between RET and RETI instructions in 8051 μC.

$$(10 \times 2 = 20)$$

3. Answer any TEN questions.

i) Mention the difference between Timer and counter in 8051 μC.

ii) Distinguish between XCH and SWAP instructions of 8051 μC.

iii) With example explain indirect addressing mode of 8051 μC.

iv) With an example explain the use of HL as index register in 8085 μP.

v) Explain how different register banks are selected in 8051 μC.

vi) With example explain JNB instruction of 8051 μC.

vii) With example explain how stack in 8085 μP is accessed.

viii) Explain the DIV instruction of 8051 μC.

ix) With example explain LDA instruction of 8085 μP.

x) Write a 8085 μP program to double the content of a memory location.

xi) Explain the IO/$\overline{M}$ signal of 8085 μP.

xii) Mention any two differences between branching and subroutine call in 8051 μC.

SECTION – B

4. Answer any SEVEN questions.

$$(7 \times 4 = 28)$$

i) With example explain the operation of a subroutine in 8085 μP.

ii) With syntax and example explain any two logical instructions of 8085 μP.

iii) Explain the following 8085 μP signals

   a) $\overline{RD}$ b) $AD_0 - AD_{15}$ c) HLDA   d) RESET

iv) With example explain CJNE command of 8051 μC.

v) Write any four differences between microcontroller and microprocessor.

vi) Explain any two conditional jump instructions of 8085 μP.

vii) Write a 8051 μC program to multiply two 8 bit numbers stored in consecutive memory locations. Store the result in next two locations.

viii) With example explain how delay program can be written using 8051 μC.

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ix) With syntax and example explain any two bit-addressable instructions of 8051 controller.

SECTION – C

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

5. a) With bit pattern explain the flag register of 8085 μP. (5)

   b) With syntax and example explain any two logic instructions of 8085 μP. (5)

6. a) With necessary diagram briefly explain the architecture of 8051 μC. (5)

   b) Explain the organization of internal RAM of 8051 μC. (5)

7. a) Write a 8051 μC program to find the number of logical one's in a 8 bit number. (5)

   b) With example explain how data is stored to and retrieved from stack in 8051 μC. (5)

8. a) With neat circuit diagram and program explain how a keyboard is interfaced to 8051 μC. (5)

   b) Draw the labelled pin diagram of 8051 μC. (5)

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(2015 Batch-onwards)

G 505.5a

Reg. No. ☐ ☐ ☐ ☐ ☐ ☐

St Aloysius College (Autonomous) Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

COMPUTER SCIENCE – Paper V

RDBMS USING ORACLE

Time: 3 hrs.

Max Marks: 100

PART – A

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

a) Define data independence. Mention the different types of data independence.

b) What is the purpose of CHECK constraint?

c) Give the general structure of PL/SQL program.

d) List any two wild characters used in pattern matching.

e) Distinguish between weak entity and strong entity.

f) Why duplicate tuples are not allowed in a relation?

g) What is a sub query? Give an example.

h) Write any two aggregate functions in SQL.

i) Define third normal form.

j) Write any four ER model symbols and give their usage.

k) What is the purpose of cursor in PL/SQL?

l) Define functional dependency.

PART – B

Answer any ONE full questions from each unit:

UNIT I

2. a) Explain the various types of attributes with examples. (5)

b) Explain the differences among an entity, entity type and entity set. (5)

c) What is data abstraction? Explain three levels of data abstraction. (5)

d) Explain the different types of database languages. (5)

3. a) Who is DBA? What are his responsibilities? (7)

b) What is a data model? Explain the different data models (7)

c) Explain the following components of DBMS (6)

   i) DDL compiler   ii) Query compiler

UNIT II

4. a) Explain the Armstrong rules (7)

b) What is a transaction? Explain the desirable properties of transactions. (7)

c) Explain the different techniques of recovery (6)

5.a) Define 1NF and 2NF relations. How to convert 1NF to 2NF relation? Give an example. (7)

b) Consider the relation R={A,B,C,D,E,F,G,H,I,J} and set of functional dependencies (7)

F={AB → C, A →DE, B→ F, F→ GH, D→IJ}

What is the key of R? Decompose the relation into 2NF and then to 3NF.

c) Explain any three relational algebra operations with example. (6)

UNIT III

6. a) Explain the following with syntax and example. (8)

i) BETWEEN   ii) ALTER TABLE   iii)UPDATE   iv)DELETE

b) Explain how the physical storage is organized in oracle. (6)

c) Explain the different data types used in oracle. (6)

7.a) What is a nested query? Explain with an example. (5)

b) Write and explain five mathematical functions in oracle. (5)

c) Explain the GROUP BY and ORDER BY clauses in SQL. (5)

d) Create table STUDENT(name, rno, class, Marks). Insert records into it (5) and write the SQL statements for the following:

i)   List the names of all the students.

ii)   Display the name and marks of II B.Sc students.

iii)   Display name, rno in ascending order of name.

iv)   Display the names of students whose name ends with "Kumar".

UNIT-IV

8.a) Explain the following cursor attributes (8)

i) % ROWCOUNT   ii)%ISOPEN

iii)%NOTFOUND   iv)%ROWTYPE

b) Explain the iterative control statements with example. (7)

c) What is a cursor? Explain the types of cursor with example. (5)

9.a) Write a function to compute the factorial of an integer. Use this (8) function to compute the value of ^nC_r.

b) What is a Procedure? Explain the creation of Procedure with Syntax (7) and example.

c) Explain the following with syntax and example. (5)

i)   Cursor for loop   ii)   Fetch Statement.

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G 505.5b(i)   Reg. No. : ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V - Degree Examination
October - 2018

COMPUTER SCIENCE – PAPER VI
Operating System and Linux

Time: 3 Hours   Max. Marks: 100

PART– A

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

    a) What is multiprocessor system? List the advantages.

    b) Differentiate between job scheduling and CPU scheduling.

    c) What is PCB? List any four contents of it.

    d) Differentiate dispatcher and dispatch latency.

    e) What do you mean by race condition?

    f) Mention two situations where reader-writer locks may be required.

    g) What is demand paging?

    h) Differentiate between physical addressing and logical addressing.

    i) What is Belady anomaly?

    j) What are the various purposes of cat command? Give examples.

    k) What is the use of sort command?

    l) Differentiate between rm and rmdir.

PART - B

Answer any ONE FULL question from each unit in PART - B

UNIT – I

2. a) Explain multiprogramming and time sharing systems.   (8)

   b) What is a process? With diagram explain different states of a process.   (6)

   c) Explain the services provided by the operating system to ensure the
      efficiency of a system sharing the resources   (6)

3. a) Write a note on real time embedded system and hand held system.   (8)

   b) What do you mean by cooperative processes? Explain the reasons for
      providing it.   (6)

   c) Explain different types of multithreading models.   (6)

UNIT – II

4. a) Explain first come first served and round robin scheduling methods   (8)

   b) Write a note on semaphores.   (6)

   c) Explain producer-consumer problem.   (6)

5. a) Write a note on Bounded buffer problem and Dining-philosopher's problem. (8)

   b) What are the requirements needed while designing solution to the critical
      section problem? Explain.   (6)

   c) Explain readers-writers problem.   (6)

G 505.5b(i)

UNIT – III

6. a) Write a note on deadlock prevention condition.

   b) Explain resource-allocation graph for deadlock avoidance.

   c) What do you mean by page fault? Explain the procedure to handle it

7. a) Explain FIFO and LRU page replacement techniques.

   b) Write a note on deadlock recovery methods.

   c) Write a note on swapping.

UNIT – IV

8. a) Explain the following commands:

   i) mv   ii) ls   iii) who   iv) cal

   b) Explain case statement with syntax, purpose and example.

   c) Write a shell script to check for prime number.

9. a) Explain the for and until looping constructs with syntax and examples.

   b) Write a note on VI editor.

   c) Explain the following commands:

   i) chmod   ii) cp   iii) grep

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(2016 Batch onwards)

G 506.5a   Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

STATISTICS – PAPER V
Design of Experiments

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

1. Answer any <u>TWELVE</u> of the following.   (2×12=24)

a) State the basic assumptions in an analysis of variance.

b) State Cochran's theorem.

c) Give the model for three way classified data and explain the components.

d) Write down the ANOVA table for one way classification.

e) Give one practical example for RBD.

f) Write the advantages of LSD.

g) Write down an expression for a missing observation in RBD.

h) Write the advantages of CRD.

i) What do you mean by missing plot technique?

j) Give the layout of an LSD with four treatments.

k) State advantages and disadvantages of factorial experiment.

l) Define main effects and interaction effects in a factorial experiment.

m) Define contrast with an example.

n) What is meant by efficiency of a design?

o) Define the term experimental unit.

PART – B

Answer any <u>SIX</u> of the following.   (6×6=36)

2. Derive the expected value of error sum of squares in two way layout.

3. Define the following terms with examples

   i) treatment   ii) experimental error.

4. Explain the procedure of testing any two treatment effects in RBD.

5. Explain CRD. Mention its advantages and disadvantages.

6. Derive the expression for one missing observation in LSD.

7. Derive an expression for the efficiency of RBD relative to LSD.

G 506.5a

8. Show that the main effects and the interaction effects in a 2^3 factorial experiment are mutually orthogonal contrast.

9. Describe Yate's method of computing factorial effect totals in a 2^2 factorial experiment.

10. Derive the expression for main and interaction effects in 2^2 factorial experiment.

PART – C

Answer any FOUR of the following.

$(10 \times 4$

11. Explain the technique of ANOVA for two way classification and the hypothesis that are usually tested. Also write down the ANOVA table.

12. What are the three basic principles of design of experiment? Explain them.

13. Explain the analysis of Latin square design.

14. Derive the expression for two missing observations in RBD.

15. Give the analysis of a 2^2 factorial experiment carried out in RBD.

16. Explain a 2^3 factorial experiment. Derive the expressions for the main and interaction effects.

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(2016 Batch onwards)

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G 506.5b

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

STATISTICS – PAPER VI
Total Quality Management

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

PART – A

1. Answer any <u>TWELVE</u> of the following.   (2×12=24)

   a) Distinguish between quality as an attribute and as a variable.

   b) What do you mean by statistical quality control?

   c) What are the assignable causes of variation in quality?

   d) What are 3σ limits?

   e) Derive control limits for np chart when standards known.

   f) Explain the role of control charts in process control.

   g) What are probability limits?

   h) What is indifference quality?

   i) Define AOQL.

   j) Write down the formula for AOQ for SSP by attributes.

   k) If $U - L = 6\sigma^1$, what is your conclusion about process capability?

   l) What is meant by an ideal OC curve?

   m) State any two situation where C-chart is used.

   n) How the process control is achieved in SQC?

   o) Write down ATI function of SSP by attributes.

PART – B

Answer any <u>SIX</u> of the following.   (6×6=36)

2. Write a note on warning limits and specification limits.

3. Explain the criteria behind the selection of subgroups.

4. What are control charts with and without standards?

5. What are the criteria for lack of control on $\overline{X} - R$ charts?

6. Explain how do you deal with the problem of varying subgroup size in a p-chart.

7. What is the statistical basis for C-chart? Establish control limits for C-chart.

8. How do you construct SSP by attributes when AQL, PR, LTPD and CR are given?

9. Describe double sampling plan.

10. Explain the method of construction of SSP by attributes minimizing ATI for a given lot quality and a point on the OC curve.

PART – C

Answer any <u>FOUR</u> of the following.

(10×4=40)

11. Outline the steps in the construction of $\overline{X} - R$ charts by deriving its limits.

12. Explain the construction and interpretation of control chart for fraction defective. How do you establish control limits for future production?

13. Distinguish between p and np charts. How is the choice between them made?

14. Explain OC function of a sampling plan. Derive an expression for SSP by attributes using

    i) Hyper geometric distribution   ii) Binomial Distribution

    iii) Poisson distribution

15. a) What is the statistical basis for U - chart? Establish the control limits for U - chart

    b) Make a comparative study of R and $\overline{X}$ charts.   (5)

16. Derive an expression for OC function of a SSP for variables with known SD when single lower specification limit L is given. From the OC how do you find PR when AQL is given.

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2D

(2014 Batch onwards)

G 507.5a

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

BOTANY – PAPER V
Environmental Science

Time: 3 Hours

Max. Marks: 100

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

SECTION - A

I   Answer any <u>TEN</u> of the following in a few sentences each   (10×2=20)

1. What is food web?

2. How steepness of the slope affects vegetation?

3. What is meant by primary and secondary productivity of the ecosystem?

4. What are endemic species? Give two examples.

5. Give one example for heterophyllous hydrophyte. What is the advantage of the heterophylly?

6. What is retrogressive succession? Give an example.

7. What is vivipary? Mention its significance.

8. Write a note on Ecesis.

9. How consumerism affects the environment?

10. Write the impacts of global warming.

11. Why energy requirement of urban population is much higher than that of rural areas?

12. Define environmental ethics.

SECTION – B

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

1. Explain the energy flow in the ecosystem.

2. What is *Ex-situ* conservation? Explain the methods.

3. Give an account on scope and importance of environmental science.

4. Explain the different groups of epiphytes with examples.

5. Describe succession on a bare rock.

6. Write notes on the modifications seen in *Ruscus* and *Acacia*.

7. Explain nuclear accidents.

8. Give an account on energy problems in India and suggest the solutions.

9. What is water shed management? Explain the methods.

SECTION – C

III Answer any _FIVE_ of the following.

1. Define biodiversity. Explain the levels and values of biodiversity.

2. Explain the different types of food chains with suitable examples.

3. Give an account on Indian biodiversity hotspots.

4. Explain the anatomical and physiological adaptations of hydrophytes with suitable examples and diagrams

5. Write the morphological and anatomical adaptations of the following:

   a) _Nerium_   b) _Vanda_   c) _Casuarina_   d) _Avicennia._

6. Describe the different stages of Hydrosere.

7. What is rain water harvesting? Explain its objectives and methods.

8. Define sustainable development. Give an account on waste land reclamation and waste land management.

9. What are the problems associated with rehabilitation and resettlement?

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G.507.5b

Reg. No.:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October – 2018
BOTANY – Paper - VI
Molecular Biology - I and Genetics

Time: 3 Hours.　　　　　　　　　　　　　　　　　　　Max Marks: 100

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

SECTION –A

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

1)　Name the types of DNA.

2)　Define muton.

3)　What is transcription?

4)　State Chargaff's law.

5)　Mention any four contrasting characters Mendel selected for monohybrid cross experiments.

6)　Define linkage.　Mention the types.

7)　Differentiate between test cross and back cross.

8)　Define the terms dominance and recessiveness.

9)　What are duplications?

10)　Define autopolyploidy.　Mention its advantages.

11)　What is trisomy?　Give an example.

12)　What are biochemical mutations?　Give an example.

SECTION – B

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

1)　Explain complementary gene interaction in plants.

2)　Write a note on types of organelle DNA.

3)　Draw a neat labelled diagram of Watson and Crick model of DNA.

4)　Explain the mechanism of sex determination in *Melandrium album*.

5)　Write a note on any two types of mutations.

6)　Explain multiple factor inheritance in plants.

7)　Describe monohybrid cross with a suitable law.

8)　Write the characteristic features of genetic code.

9)　Explain the types of physical mutagens with examples.

SECTION – C

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

1)　Give an account on the experimental evidences to prove DNA as genetic material.

2)　Write an account on molecular basis of point mutations.

G.507.5b

3) Explain translation process in protein synthesis.
4) Describe different types of crossing over. Add a note on its cytological evidence and its significance.
5) Define dominant epistasis with a plant example.
6) Write an explanatory note on incomplete linkage with a suitable plant example.
7) Give an account on Semiconservative method of replication in DNA.
8) Give an account on role of allopolyploidy in plant breeding, giving three examples.
9) Describe reciprocal translocations in plants.

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(2014 Batch onwards)

G.508.5a

Reg. No.: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018
ZOOLOGY – PAPER V
HISTOLOGY, REPRODUCTIVE AND
DEVELOPMENTAL BIOLOGY

Time: 3Hours.   **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 differential staining technique?

b) List any two advantages of paraffin embedding.

c) What is corpus luteum? Mention its function.

d) What is a polar body?

e) Explain the term hermaphroditism.

f) What is acrosome?

g) Explain the polarity of frog's egg.

h) What is chalaza? Explain its function.

i) List any two functions of amnion.

j) What is meant by capacitation of sperm?

k) What is chorio-allantoic placenta? Explain.

l) Explain the term surrogate mother.

PART – B

Select ONE full question from each unit.

Unit I

II a) What is microtomy? Explain the processing of tissue for histological   **(10)**
sectioning.

b) Describe T.S of mammalian pancreas with the help of a neat labelled   **(5)**
diagram.

c) Draw and explain T.S of mammalian testis.   **(5)**

OR

III a) Explain the process of localization of proteins.   **(10)**

b) Draw and explain T.S of mammalian liver.   **(5)**

c) Explain the histological structure of mammalian thyroid.   **(5)**

Unit II

IV a) Explain the process of oogenesis in humans with illustration.   **(10)**

b) List the temporary methods of family planning.   **(5)**

c) What is amphimixis? Explain with the help of a diagram.   **(5)**

OR

V a) With reference to parthenogenesis explain arrhenotoky and thelytoky **(10)**
with suitable examples.

b) Compare the process of spermatogenesis and oogenesis.   **(5)**

c) Explain estrous cycle in rodents.   **(5)**

G.508.5a

Unit III

VI a) Describe the process of notogenesis and neurogenesis in frog with illustration. **(10)**

b) Explain the development, structure and function of allantois. **(5)**

c) With the help of a diagram explain 24 hours chick embryo. **(5)**

OR

VII a) Draw and explain the structure of hen's egg. **(10)**

b) Draw and explain the fate map of frog. **(5)**

c) List the scope of embryology. **(5)**

Unit IV

VIII a) With the help of neat labelled diagram explain ovulation, fertilization and implantation in humans. **(10)**

b) Give a brief account of placental hormones. **(5)**

c) Write short notes on animal cloning. **(5)**

OR

IX a) Classify the different types of placenta based on histological structures with illustration. **(10)**

b) With reference to manipulation of reproduction, explain IVF and artificial insemination. **(5)**

c) Explain theories of organizer phenomenon. **(5)**

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018
ZOOLOGY – PAPER VI
ENVIRONMENTAL BIOLOGY, BIOSTATISTICS AND WILDLIFE BIOLOGY

Time: 3Hours.   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 diapause? How it is controlled by light.
  b) Define biome. Name the major biomes of the world.
  c) Define food chain. Mention any two types of major food chains.
  d) Comment on biotic potential of a population.
  e) What is acid rain?
  f) Write a short note on bioindicators.
  g) What is biostatistics? Write its application.
  h) Write the formula to calculate standard deviation.
  i) What are threatened species? Give examples.
  j) What is Wallace's line?
  k) Name any four national parks of Karnataka.
  l) Expand CITES and WWF.

PART – B

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

Unit I

II a) Define abiotic factor. Explain temperature as an abiotic factor with   (10)
      reference to thermal stratification, extreme temperature and
      cyclomorphosis.
   b) Briefly explain aquarium ecosystem.   (5)
   c) Explain ecological pyramids.   (5)

OR

III a) Explain food web and food chain with a schematic illustration.   (10)
    b) Explain parasitism with relevant examples.   (5)
    c) Explain light as an abiotic factor.   (5)

Unit II

IV a) Explain lentic and lotic ecosystems.   (10)
   b) Explain the process of ecological succession.   (5)
   c) Give an account of any two terrestrial habitats.   (5)

OR

Contd...2

UNIT – III

4. a) Describe the structure and functions of central lymphoid organs.

OR

4. b) Write in detail on Humoral immune response.

(9

4. c) Write a short note on monoclonal antibody production.

(6

UNIT – IV

5. a) Describe the pathogenesis and laboratory diagnosis of Salmonella infection.

OR

5. b) Describe the pathogenesis and laboratory diagnosis of Streptococcal infection.

(9

5. c) Write a short note on antibiotic resistance.

(6)

PART -C

Answer any FOUR of the following:

6. a) Passive immunity

(5x4=20)

b) Immunoglobulin specificity

c) Cytokines

d) Antibiotic sensitivity test

e) Toxins of Staphylococcus

f) Interferons

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(2014 batch onwards)

G 509.5b

Reg. No. ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V - Degree Examination
October - 2018

MICROBIOLOGY-Paper VI
Plant Microbiology and Bioremediation

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) Azospirillum biofertilizer

   b) Rhizobia

   c) Soil borne diseases

   d) Alternaria

   e) Cellulose

   f) Control of Koleroga

   g) PCBs

   h) Biomagnification

   i) Persistence

   j) Amylase

   k) Soil sickness

   l) Humus

PART B

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

(15x4=60)

UNIT – I

2. a) Define biofertilizer. Explain in detail Azotobacter biofertilizer.

OR

2. b) Define biofertilizer. Explain in detail Azolla biofertilizer.   (9)

2. c) Explain biological control of diseases of aerial plants parts with   (6)
       bacteria.

UNIT – II

3. a) Explain in detail Sandal spike disease.

OR

3. b) Explain role and types of microbial toxins in plant disease.   (9)

3. c) Write briefly about dissemination of pathogens.   (6)

Contd..2

G 509.5b

UNIT – III

4. a) Explain about biodegradation of organic pollutants.

OR

4. b) Explain about the strategies of bioremediation.

4. c) Write briefly on advantages and disadvantages of bioremediation.

UNIT – IV

5. a) Explain the microbiology of Lignin degradation.

OR

5. b) Explain the methods of composting.

5. c) Write briefly about degradation Pectin.

PART -C

Answer any FOUR of the following:

(5x4=20

6. a) Write briefly on BGA biofertilizer.

b) Write about bacterial biological control of post harvest diseases.

c) Give an account of stages in disease development.

d) Write briefly about the environmental factors affecting biodegradation.

e) Write a short note on green manure.

f) Anaerobic decomposition of organic matter.

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G 510.5a

(2013 batch onwards)
Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V– Degree Examination
October- 2018
BIOCHEMISTRY - Paper V
Molecular Biology

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 okazaki fragments?
   b) Write the role of puromycin on translation.
   c) Explain Chargaff's rule.
   d) What are introns and exons?
   e) What is the difference between transition and transverion mutation?
   f) Write the function of RNase.
   g) Explain the difference between Nucleotide and Nucleoside with an example.
   h) Explain Central dogma of molecular biology.
   i) Explain briefly conjugation as a method of gene transfer in bacteria.
   j) Write the structure of purine and pyrimidines.
   k) Describe the function of restriction endonucleases.
   l) What are Ribozymes? Write their functions.

PART – B

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

2. Explain Hershey chase experiment.
3. Explain Lac-Operon model.
4. Explain general features of genetic code.
5. Explain the structure of eukaryotic chromosome.
6. Explain the steps involved in prokaryotic translation.
7. Explain Tm and Cot curve.
8. Write a note on Holliday model.
9. Write a note on secondary structure of t-RNA.

PART -C

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

10. Define Mutation. Explain various types of mutagens and their effects.
11. Explain steps involved in DNA replication.
12. a) Explain Watson and Crick model of DNA.
    b) Describe Meselson and Stahl experiment.
13. Explain post transcriptional & post translational modifications in eukaryotes.
14. Explain a method for isolation of total cellular RNA.
15. Explain steps involved in transcription of prokaryotes.
16. Explain the mechanism of transformation and transduction in bacteria.

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(2013 batch onwards)

G 510.5b

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V– Degree Examination
October- 2018
BIOCHEMISTRY - Paper VI
Biotechnology, Food and Industrial 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) What are Ti Plasmids? Which are the genes present in Ti plasmid?

   b) What is cryopreservation? Give one example for cryoprotectant.

   c) Give any two application of southern blotting technique.

   d) Name the methods of preservation of microorganisms.

   e) What are edible vaccines? Give one example.

   f) Name any two growth regulators in Plants.

   g) What are secondary metabolites? Give any two functions.

   h) Define tissue culture. Name the types of plant tissue culture.

   i) What is continuous culture? Give one application.

   j) Name any two media used in plant tissue culture.

   k) Give any two applications of BT cotton.

   l) What is meant by electroporation? Give its applications.

PART – B

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

2. Explain the methods and applications of cryo preservation.

3. Write a note on Northern Blotting technique.

4. Explain the role of micro and macro nutrients in tissue culture.

5. Give a note on transfection.

6. Write a note on sterilization techniques.

7. Explain the methods of preservation and storage of fruits and seeds.

8. Write a note on SCP.

9. Explain the principle and isolation methods of protoplast.

PART -C

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

10. Give an account on restriction endonucleases.

11. Explain the production of any one antibiotic and alcoholic beverage.

12. Describe the principle and applications of PCR.

13. Explain *Agrobacterium* mediated gene transfer and mention its advantages and limitations.

14. Write a note on food poisoning and food intoxication.

15. Explain Transformation and add a note on characteristics of pBR322.

16. Give an account on gene therapy.

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(2014 Batch onwards)

G 511.5a

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2018

BIOTECHNOLOGY – PAPER V
Plant Biotechnology

Time: 3 Hours

Max. Marks: 100

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

PART - A

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

(10×2=20)

1. a) Define micropropagation with two basic principles.

b) Mention the functions of gibberellin in tissue culture.

c) Define cytodifferentiation.

d) What are antibrowning agents? Give examples

e) Give two sources each for cellulases and macerases.

f) Define somatic hybridization.

g) Define secondary metabolite with its classification.

h) Which are the different techniques used for the production of diploids from haploid plants?

i) What is meant by opines?

j) Name the marker genes used for the identification of transformed cells?

k) Mention the advantages of DMSO.

l) Define vitrification.

PART – B

Answer any <u>SIX</u> of the following.

(6×5=30)

2. Give an account on role of pH, gelling agents in plant tissue culture.

3. Explain the role of cytokinin and auxin in organogenesis.

4. Discuss on somatic embryo versus zygotic embryo.

5. Discuss testing of viability of isolated protoplasts.

6. Explain any two methods of protoplast fusion techniques.

7. Elaborate on direct and indirect androgenesis.

8. Explain somaclonal variation.

9. Give an account on Bt cotton.

10. Describe meristem tip culture.

G 511.5a

PART – C

Answer any <u>FIVE</u> of the following.

(5×10=5

11. Explain plant tissue culture media and preparations.

12. Discuss on synthetic seed production.

13. Describe the principle and protocol for the isolation of protoplast from intact leaves

14. Explain factors affecting and ploidy checking of haploid plants.

15. Narrate *Agrobacterium* mediated gene transfer.

16. Discuss on cryopreservation and germ plasm conservation.

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(2014 Batch Onwards)

G 511.5b

Reg. No. :

St Aloysius College (Autonomous)

Mangaluru

B. Sc. Semester V- Degree Examination

October - 2018

BIOTECHNOLOGY –PAPER VI

ANIMAL BIOTECHNOLOGY

Time: 3 Hours

Max. Marks: 100

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

PART – A

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

a) What is cryopreservation? Give one example for cryoprotectant.

b) Write the composition and role of Balanced salt solution.

c) What is cell Synchronization?

d) What is the significance of MTT assay.

e) What are cell lines? Give example.

f) What is Immunostaining?

g) What is Monolayer culture?

h) What is the function of CAD proteins?

i) Define Xenotransplantation.

j) SCID

k) What is the function of Tissue Plasminogen Activator?

l) Write 4 limitations of cloning.

PART – B

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

2. How are tissues disaggregated chemically?

3. Explain the technique involved in cell viability testing?

4. What is micro- encapsulation? Write its application.

5. Explain the role of antibiotic resistance markers in gene expression.

6. Write about the physical methods of cell fusion and their limitations.

7. Explain the principle behind transgenic cattle.

G 511.5b

8. Explain the process involved in the production of Hepatitis B Vaccine through genetic engineering.

9. How silkworms act as a bioreactor for the production of heterologous protein?

10. Explain about somatic gene therapy with example.

PART – C

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

11. Write a detailed account on the different types of media used for animal cell culture.

12. Explain any 2 techniques involved in measurement of cell proliferation.

13. Explain the methods involved in organ culture.

14. How to produce monoclonal antibodies through hybridoma technology.

15. Explain the process involved in cloning Dolly.

16. What are stem cells? Add a note on its application and limitations.

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G 110.5a/ G 512.5a

Reg. No.

St Aloysius College (Autonomous) Mangaluru

B.A./B.Sc Semester V – Degree Examination
October - 2018
COMPUTER ANIMATION – Paper V
3D Texturing, Camera and Lighting

Time: 3 hrs.

Max Marks: 100

SECTION A

1. **Answer any TEN of the following:** (10x2=20)
   a) How to Render 3D file to high resolution image?
   b) What is the use of Ink and paint material?
   c) How to disable the shadow only for one object?
   d) What is the use of Bank option for camera?
   e) What is the use of giving set ID's?
   f) Name the Lens effects.
   g) What is the role of intensity under lights?
   h) Name the photometric lights.
   i) How to create projector scene?
   j) What is the use of specular level and glossiness?
   k) What is the use of opacity map?
   l) How to fix camera to path?

SECTION – B

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

2. Write down the steps to create tennis court.
3. What are the steps to create golden trophy.
4. Write a note on Omni Light.
5. What are the steps to create a multi colored ball?
6. What is the difference between perspective view and camera view?

SECTION – C

Answer any TWO of the following: (2x10=20)

7. Explain important properties of lights.
8. Write a note on diffuse color mapping
9. What is the difference between reflection and refraction?

SECTION – D

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

10. What is the importance of lights and cameras in 3D?
11. Write a brief note on all shaders and maps of 3D Max.
12. Explain briefly about hair and fur modifier.

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G 110.5b (i)/G 512.5b(i)　　　(2016 Batch onwards)

Reg. No. ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.A./B.Sc. Semester V – Degree Examination
October - 2018
COMPUTER ANIMATION PAPER VI
Web Designing Fundamentals

Time: 3 hrs.

Max Marks: 100

PART – A

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

1. a) What is SERP?

   b) Expand HTTP and HTTPS.

   c) What is a dedicated host?

   d) How important is title tag in a web page?

   e) What is caption in tables?

   f) Describe the use of point to file icon?

   g) Write a short note on word press.

   h) Define named anchor.

   i) Explain screen reader software.

   j) Name the attributes of font tag.

   k) How useful are the tracing images?

   l) Describe roll over image in DW.

PART – B

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

2. Name and explain the text formatting tags.

3. Write about computer networks.

4. Discuss about the popular search engines.

5. Differentiate static and dynamic web pages.

6. How to make a web page in photoshop? Explain.

PART - C

Answer any TWO of the following: (2x10=20)

7. How to use image hotspots in DW?

8. Define WWW and explain its features.

9. Explain WYSIWYG editors.

PART - D

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

10. How to create a web page using DIV tags? Explain.

11. Name and explain the form tags.

12. Define modem and browser. Explain the popular browsers.

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(2016 Batch onwards)

G 513.5a

Reg. No. : ☐ ☐ ☐ ☐ ☐ ☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER V – Degree Examination
October - 2018
ECONOMICS - Paper V
DEVELOPMENT 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. Find out GDI from the following values.

   GNI_{pcf} = \$971.7, GNI_{pcm} = \$1,175.2

   Female Health Index = 0.6508

   Male Health Index = 0.6985

   Female Education Index = 0.4239

   Male Education Index = 0.4667

2. Write a note on 'Shocks' and 'Stimulants'.

3. What are the arguments for High Capital –Output ratio in UDCs?

4. Write a note on 'Feldman's model of growth.

5. What are the problems of human capital formation?

6. Write a note on 'new technology and sustainable agriculture.

PART – B

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

7. Find out GDI from the following table.

Indicator	Female Value	Mean Value
Life expectancy at Birth (years)	64.8	62.9
Expected years of Schooling (years)	10.7	10.8
Mean years of Schooling (years)	3.8	5.0
Wage Ration (Female/Male)	0.8 (Imputed)	
Gross National Income percapita (2011 PPP $)	1,073.29	
Share of economically active population	0.509	0.491
Share of population	0.5008	0.4992

8. Explain the Balanced Growth Theory of Economic Development.

9. Explain the role of technology in economic development.

10. Examine Jorgenson's neo-classical model of a dual economy.

11. 'Population is a growth retarding factor'. Examine.

12. Explain the role of agriculture in economic development.

G 513.5a

PART – C

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

13. Explain the various determinants of economic development

14. Examine the 'Unbalanced Growth Theory' of economic development. What a criticisms?

15. Explain the Solow Model of long-run growth. What are its criticisms?

16. Examine Lewis' Theory of 'Unlimited Supply of Labour'. What are its criticism

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G 513.5b

Reg. No. : | | | | | |

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER V – Degree Examination
October - 2018
ECONOMICS – Paper VI
MATHEMATICAL ECONOMICS

Time: 3 hrs.

Max Marks: 100

PART - A

Answer any FOUR of the following questions. (4×5=20)

1. Find the elasticity of demand, when demand function $D = 40 - 2P$ and the $P = Rs. 10, P = Rs. 15$ and $P = Rs. 5$.

2. Calculate the equilibrium values for the behavioural equations $D = 100 - 4P^2$ and $S = 100 + P^2$.

   i) Plot the Equilibrium Values on the graph.

3. The MPC is given by $\frac{dc}{dy} = 0.7 + \frac{0.2}{\sqrt{Y}}$, where Y is disposable income. When income is 0, consumption is 8 billion of rupees. Find the total consumption function.

4. Find Consumer Surplus for the demand function $P = 25 - 3X - 3X^2$. When demand $X_0 = 2$.

5. Solve for 'X' & 'Y' for the equations $4X + Y = 11$ and $3X + 5Y = 21$ by Cramer's rule.

6. Write a note on Linear Programming.

PART - B

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

7. Following are the financial details of 2 companies.

	Company A	Company B
Fixed Cost	3000	50000
Price/Unit	100	90
Variable Cost/Unit	40	3

Find out the break even, to understand which company (A or B) would be able to make profits.

8. Calculate the maturity value for the following 2 markets.

   i) $P = 100$, $r = 4\%$ $n = 2$ years.

   ii) $P = 15000$, $r = 6\%$ & $n = 2$ years.

9. State the conditions for the equilibrium and derive the level of output, price, TC, AC and profit (π) for the TR is $100Q - 2Q^2$ and $TC = 50 + 2Q$.

10. If the marginal revenue function $MR = 100 - 49$, find the total revenue function and average revenue function.

Contd...2

11. A firm produces 3 products A, B,C which it sells in two markets. Annual sales in units are given below:

Market	Units Sold		
	A	B	C
I	8,000	4,000	16,000
II	7,000	18,000	9,000

If the price per unit of A, B, C are Rs.2.50, Rs.1.25 and Rs.1.50 and the cost per unit are Rs.1.70, Rs.1.20 and Rs.0.80 respectively. Find total profit in each market by using matrix algebra.

12. Use graphical method to solve,

Maximise $Z = 4X_1 + 3X_2$

Subject to, $2X_1 + X_2 \leq 1000$

$\qquad X_1 + X_2 \leq 800$

$\qquad\qquad X_1 \leq 400$

$\qquad\qquad X_2 \leq 700$

$\qquad X_1, X_2 \geq 0$

PART – C

Answer any _TWO_ of the following questions.   (2×20=40)

13. Find the equilibrium values and change in the equilibrium values because of tax and subsidy. The behavioural equations are $D = 10 - 5P$ and $S = -12 + 2P$, the tax per unit=4 Rupees and a subsidy per unit=5 Rupees.

14. Given the demand function and average cost functions of a monopoly firm as $P = 32 - 3Q$ and $AC = Q + 8 + \frac{5}{Q}$. What is the level of output that maximizes total profit and what are the corresponding vales of AR, MR,TC, AC & MC and also the profit (π).

15. The demand functions of a 2 sub markets and TC function of a discriminative monopoly firm are given as follows,

$P_1 = 14 - 2Q_1$

$P_2 = 35 - 4Q_2$ and $TC = 2Q_1 + 3Q_2 + 4$

Find the equilibrium values of $P_1, P_2, Q_1, Q_2, MR_1, MR_2$ and profit under the Discriminative Monopoly.

16. Find the equilibrium values of price and quantity for the 3 commodity [A, B & C] General Equilibrium model using Matrix Inversion.

$QS_A = 3P_A - 65$ $Qd_A = 100 - 2P_A - 2P_B + P_C$

$QS_B = 5P_B - 95$ $QS_B = 135 - 4P_A - 3P_B + 2P_C$

$QS_C = 6P_C - 10$ $Qd_C = 140 + P_A + P_B - 2P_C$

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G 501.5a

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V– Degree Examination
October - 2019
PHYSICS – PAPER V
ATOMIC PHYSICS

Time: 3 hrs.   Max Marks: 100

SECTION – A

1. **Answer any TEN of the following.**   (10×2=20)
   a) What is the significance of magnetic orbital quantum number m_l?
   b) Why is S level a single state?
   c) Name two distinct features of vector atom model.
   d) What is meant by spin-orbit coupling?
   e) Write the relation between group velocity and phase velocity of de Broglie wave.
   f) What is expectation value? Give the expression for expectation values of position coordinate x.
   g) Explain the physical significance of wave function.
   h) Distinguish between a free particle and a particle in a box.
   i) H_2, N_2 and O_2 molecules do not show pure rotation spectrum. Give reason.
   j) What is Rayleigh scattering? Give an example.
   k) What is meant by "depolarization ratio"? What is its significance?
   l) What is Compton effect?

SECTION – B

Answer TWO full questions from each unit:

UNIT – I

2.a) What are coupling schemes? Explain L-S coupling and J-J coupling in multi electron systems.   (6)
   b) Explain the fine structure of sodium D lines.   (4)

3.a) Describe with theory, the Stern-Gerlach experiment.   (6)
   b) State and explain Pauli's exclusion principle. Obtain the expression for maximum number of electrons in the nth shell.   (4)

4.a) Obtain the expression for magnetic dipole moment of electron due to orbital motion and spin.   (6)
   b) Describe the experimental arrangement for observing normal Zeeman effect and mention the observations made.   (4)

UNIT – II

5.a) Explain de-Broglie hypothesis of matter waves and arrive at the expression for de-Broglie wavelength. Deduce the relation connecting de-Broglie wavelength of electron and i) kinetic energy of electron ii) accelerating potential for electron.   (6)
   b) Based on uncertainty principle, account for the finite width of spectral lines.   (4)

6.a) Describe briefly, Davison-Germer experiment and analyse the results obtained in support of de-Broglie hypothesis of matter waves. (6)
   b) For a particle in a linear potential box of infinite height, write expressions for eigen values of energy and eigen functions for such a particle and also the probability density.   (4)

7.a) Set up the time dependent Schrodinger wave equation. (6)

b) State Heisenberg's uncertainty principle. Give the three uncertainty relations with explanations. (4)

UNIT – III

8.a) Describe the Millikan's oil drop experiment to determine charge of the electron. (6)

b) Mention the different regions of molecular spectra. Explain the applications of molecular spectra. (4)

9.a) Assuming the expression for rotational energy of a diatomic molecule, obtain the expression for wave number of the spectral lines and discuss the rotational spectrum of the molecule. (6)

b) Distinguish between stokes and anti-stokes lines. Mention the applications of Raman effect. (4)

10.a) Derive the expression for the change in wavelength in Compton Scattering. (6)

b) Discuss the quantum theory of Raman effect. (4)

SECTION – C

Answer any FOUR of the following: (4×5=20)

11. Calculate value of Bohr magneton if Planck's constant h= 6.63×10^{-34} Js. Mass of electron = 9.1×10^{-31} kg and charge of electron = 1.6×10^{-19}C. What will be the magnetic moment of a d – sub shell electron due to (a) orbital motion and (b) spin motion.

12. A source emitting monochromatic radiation of wavelength 486nm is subjected to a magnetic field of 0.4T. Calculate the Zeeman shift in frequency and the Zeeman shift in wavelength.
Given e/m of electron=1.76×10^{11}C/kg.

13. A particle is moving in a one dimensional box of infinite height and width 10A°. Calculate the probability of finding the particle within an interval of 1A° at the centre of the box when it is in the state of least energy.

14. The energy of a linear harmonic oscillator in its third excited state is 0.1eV. Calculate the frequency of vibration. Also find the zero point energy of the oscillator. Given h=6.63×10^{-34}Js.

15. The lines in the pure rotation spectrum of HCl molecule are spaced 2080m^{-1}. Calculate the moment of Inertia and bond length of the molecule. Mass of proton = 1.67×10^{-27} kg and mass of chlorine = 58.5×10^{-27} kg respectively.

16. In a cathode ray tube, an electron in the beam is accelerated by a potential difference of 20kV. It then passes through a uniform magnetic field describing a circular path of radius 0.12m. What is the strength of the magnetic field?

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G 501.5b

Reg. No. :

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V– Degree Examination
October - 2019
PHYSICS – PAPER VI
SOLID STATE PHYSICS

Time: 3 hrs.

Max Marks: 100

SECTION – A

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

a) Explain the importance of statistical approach in physics.

b) Define Debye frequency.

c) What is thermal conductivity? Give the SI unit for coefficient of thermal conductivity.

d) Show that at low densities B.E and F.D statistics reduce to M.B statistics.

e) Define drift velocity. Write the expression for it.

f) Distinguish between metals and semiconductors.

g) Mention any two significance of Hall Coefficient.

h) Define the terms i) mobility   ii) relaxation time

i) Draw Miller planes (100) and (110) in a cubic lattice.

j) What is i) glass transition temperature?
   ii) amorphous solid?

k) State Moseley's law.

l) What are dielectric materials? Give an example.

SECTION – B

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

UNIT – I

2.a) State and explain Dulong-Petit law. What are its limitations? (6)

 b) Explain Boltzmann tail. (4)

3.a) Explain the three distribution laws in physics. (6)

 b) Explain scattering by imperfections in a solid. (4)

4.a) Give Einstein's model of a solid. Discuss the variation of specific heat of a solid at low and high temperatures according to Einstein's theory. (6)

 b) Give the limitations of Einstein's theory of specific heat. (4)

UNIT – II

5.a) Define Fermi energy and obtain an expression for it at absolute temperature. Hence obtain the expression for the average energy of the electrons. (6)

 b) Discuss the variation of resistance of an intrinsic semiconductor with temperature. (4)

6.a) What are extrinsic semiconductors? Explain with energy level diagrams n and p-type semi conductors. (6)

b) Give Somerfield's model of a solid.   (4)

7.a) Obtain an expression for the electrical conductivity of a metal using
classical free electron theory and hence arrive at Ohm's law.   (6)

b) Derive the expression for electrical conductivity of an intrinsic semi
conductor.   (4)

UNIT – III

8.a) State Bragg's law and explain Bragg's spectrometer.   (6)

b) Give the brief account of the origin of atomic magnetism.   (4)

9.a) i) Explain how Miller indices are obtained for a crystal plane.
ii) Represent the Miller planes (100), (110) and (111).   (6)

b) Explain the properties of diamagnetic and paramagnetic materials.   (4)

10.a) Explain B-H curve of ferromagnetic material.   (6)

b) Obtain the relation between electric polarization and dielectric
susceptibility.   (4)

SECTION – C

Answer any FOUR of the following: (4×5=20)

11. In a metal, velocity of longitudinal and transverse waves are $6412 ms^{-1}$ and
$3218 ms^{-1}$ respectively. Calculate Einstein temperature if 6.02×10^{26} atoms
exists in one cubic metre of the metal.

12. In Lee-Charlton experiment, the mass of the disc was 2Kg and the specific
heat of the material was 390 J/kg/K. The diameter of the disc was 10cm and
the thickness of the insulting material was 0.3 cm. If the temperature
difference across the surface was 15°C and the rate of cooling of metal was
1°C/s. Calculate the coefficient of thermal conductivity of the insulator.

13. Assume that each copper atom contributes one electron to the free electron
gas. If the conductivity of copper=6×10^5 mho/cm, its atomic weight 63.54
and density=8.96 gm/cc. Calculate the average speed of the electron at
27°C and mean free path.

14. Calculate the Fermi energy and average energy of a solid material at 80°C,
given its Fermi energy at absolute zero is 8eV, K=1.38×10^{-23}J/K.

15. In Bragg's spectrometer, the glancing angle for second order spectrum is
observed to be 24°. Calculate the wavelength of the X-ray, if the crystal
lattice spacing is 2.85×10^{-10}m.

16. A magnetic field strength in a metal is 10^6 A/m. If the magnetic
susceptibility of the metal is -0.8×10^5, calculate the flux density and
magnetization in the metal.

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(2014 Batch onwards)

G 502.5a

Reg. No:

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

· CHEMISTRY- PAPER V

Time: 3 Hours

Max. Marks: 100

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

PART – A

Answer any TEN of the following questions in 1 to 3 sentences (2×10=20)

1. a) Explain Raoult's law.

   b) What is meant by abnormal molecular mass?

   c) State Nernst-Distribution law.

   d) Give any two applications of nanoscience in biology.

   e) What is redox couple? Give an example.

   f) Give one example for the use of complexation in qualitative analysis.

   g) What is meant by bathochromic shift?

   h) Give any two limitations of Beer-Lambert's law.

   i) Give the IUPAC name of thiophene and pyridine.   ·

   j) Arrange the following in the increasing order of their basicity:

   Pyridine, piperidine and pyrrole

   k) Give the halogenation reaction in isoquinoline.

   l) Write the skeletal structure of myoglobin.

PART – B

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

(3×10=30)

2. i) A solution of 1.25g of a certain non-electrolyte in 20g of water freezes at 271.95 K.

   Calculate the molecular mass of the solute $\left(K_f = 1.86\,K\,kg\,mol^{-1}\right)$.

   ii) Write a note on phenol-water system.

   iii) Explain the principle of Parke's process of desilverisation of lead.

   iv) What are nano composites? Explain with example.

   v) What is masking in volumetric analysis? Explain with an example.

   vi) How do you convert Latimer diagram to Frost diagram?

   vii) Discuss the application of redox potential data.

   viii) Explain Frank-Condon principle.

   ix) Give the mechanism of electrophilic substitution in Thiophene.

   x) Explain Paal-Knorr method for pyrrole synthesis.

Contd...2

xi) Explain Bischler-Napieralski synthesis for isoquinoline.

xii) Explain Bohr's effect.

PART - C

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

3. Derive thermodynamic relationship between molecular mass and depression in freezing point.

4. Explain the determination of molecular weight of a non-volatile solute by Walker-Lumsden method.

5. With a neat diagram explain steam-distillation.

6. Describe any one method for the synthesis of nano materials.

7. Explain the redox stability in water on the basis of Pourbaix diagram.

8. Discuss the applications of complexation reactions in metallurgy.

9. Describe the types of electronic transitions that take place on absorption of UV radiation.

10. Explain concept and effect of addition of chromophores in electronic spectroscopy with suitable example.

11. Explain mechanism of nucleophilic substitution in pyridine.

12. Explain Skraup synthesis.

13. Explain Fiest-Benary synthesis of furan.

14. What is sodium-potassium pump? Describe its mechanism.

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(2014 batch onwards)

G 502.5b

Reg. No: [ ][ ][ ][ ][ ]

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

CHEMISTRY – Paper VI

Time: 3 Hours

Max. Marks: 100

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

PART – A

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

(2x10=20)

a) State and explain Heisenberg's uncertainty principle.

b) Write Schroedinger wave equation and explain the terms involved in it.

c) HCl molecule shows pure rotational spectrum, while H_2 molecule does not. Give reason.

d) Write the selection rule for rotational transition.

e) Define antiferromagnetic substances. Give an example.

f) Define Curie temperature and Neel temperature.

g) Write ground term for d^2 system.

h) State Laporte-selection rule.

i) What is isoelectric point of the amino acids?

j) What are oligosaccharides? Give an example.

k) Write any two applications of mass spectroscopy.

l) What are epimers? Give an example.

PART – B

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

(3x10=30)

i) In a Compton effect, the scattered radiation is perpendicular to the incident radiation. Calculate the Compton shift.

(c=$3x10^8$ m/s, h=$6.626x10^{-34}$ J s, m=$9.109x10^{-31}$ kg)

ii) Write a short note on photoelectric effect.

iii) Show that the successive lines in rotational spectra are separated by 2B.

iv) Explain the effect of isotopic substitution on rotational spectra of a diatomic molecule.

v) Calculate the magnetic moment for a Ti^{+2} complex based on spin-only formula.

vi) How is magnetic moment data useful in predicting the geometry of the complexes?

vii) Explain any two types of electronic transitions.

viii) What are silicones? Give two examples.

ix) Explain Gabriel phthalimide synthesis of an amino acid.

x) What is mutarotation? Give its mechanism.

xi) Explain the terms base peak and parent ion peak.

xii) How are proteins classified based on the shape and structure? Give one example for each class.

PART – C

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

3. Describe the spectral distribution of black body radiation.

4. Derive de Broglie equation for matter wave. Show that it is significant only for microscopic particles and not for macroscopic particles.

5. The pure rotational spectrum of hydrogen fluoride gives a series of lines whose separation is 4050 m^{-1}. Calculate the moment of inertia and inter nuclear distance for the molecule.
   ($N=6.022 \times 10^{23}$, $h=6.626 \times 10^{-34}$ J s, atomic mass of H=1 a.m.u and F=19 a.m.u)

6. Derive an expression for moment of inertia of a diatomic molecule.

7. How is magnetic susceptibility measured by Gouy's method?

8. Explain the electronic spectra of $[Ti(H_2O)_6]^{+3}$ complex ion.

9. Write Orgel diagram for d^1 and d^9 system with suitable example.

10. Explain the structure and preparation of boron nitride.

11. How is the structure of peptides determined by end group analysis?

12. Explain the mechanism of osazone formation.

13. How is ring size of D(+) glucose determined?

14. Explain McLafferty rearrangement with suitable example.

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(2014 Batch onwards)

G 503.5a

Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October – 2019

MATHEMATICS – Paper V
Algebra, Differential equations and Laplace Transforms

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

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

1. In a ring R prove that $(-a)(-b) = ab$, for all $a, b \in R$.

2. Prove that any field is an integral domain.

3. Prove that kernel of a homomorphism is an ideal.

4. Find all the units of $J[i]$, the ring of all Gaussian integers.

5. If $g.c.d$ of two elements exists, prove that they are unique upto unity.

6. Prove that $f(x) = x^2 + x + 1$ is irreducible over the ring of integers modulo 2.

7. Find the general solution of $(D^3 + 3D^2 - 4D)y = 0$.

8. Solve $(D^2 - 3D + 2)y = 16$.

9. Find a particular solution of $(D^2 - 1)y = \sin 2x$.

10. Transform $x^2 \dfrac{d^2y}{dx^2} + x\dfrac{dy}{dx} - 3y = x^2$ to differential equation with constant coefficients using the substitution $z = \log x$.

11. Find A in the method of variation of parameters to solve $(D^2 + 1)y = \cot x$ if $y = A\cos x + B\sin x$.

12. Reduce $y'' - \dfrac{2}{x}y' + \left[1 + \dfrac{2}{x^2}\right]y = xe^x$ to normal form.

13. Find $L\{t^n\}$.

14. Show that $L\{\cosh kt\} = \dfrac{s}{s^2 - k^2}, s > |k|$.

15. Evaluate $L^{-1}\left\{\dfrac{3}{s^2 + 4}\right\}$.

PART – B
UNIT - I

Answer any THREE of the following.

(3×5=15)

1. Let R be a commutative ring with unit element whose only ideals are (0) and R. Prove that R is a field.

Contd...2

2. Prove that the intersection of two ideals of a ring is an ideal. What about the union? Justify your answer.

3. Let $f : R \to R'$ be a homomorphism of R into R', then show that f is $(1, 1)$ map if and only if $\ker f = 0$, where R and R' are rings.

4. Prove that a finite integral domain is a field.

5. Prove that an ideal (p) in the ring of integers is a maximal ideal iff p is a prime number.

UNIT - II

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

1. Prove that in a Euclidean ring R an element a is a unit if and only if $d(a) = d(1)$.

2. Prove that in a polynomial ring $\deg(f(x).g(x)) = \deg f(x) + \deg g(x)$.

3. If P is a prime number of the form $4n + 1$, then prove that the congruence $x^2 \equiv -1 (\mod p)$ is solvable.

4. Prove that every ideal of an Euclidean ring R is of the form $I = Ra$, for some a in R.

5. Prove that an element 'a' in a Euclidean ring is either a unit or can be written as a product of prime elements.

UNIT - III

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

1. Solve: $(D^4 - 2D^3 + D^2)y = x^3$.

2. Solve: $D(D-2)^2 y = e^{2x}$.

3. Solve: $(D^2 + 4D + 3)y = 2\sin 3x$.

4. Solve: $y'' - 2y' = 12x - 10$.

5. Solve: $(D^2 - 3D + 2)y = \sin x + x^2$.

UNIT - IV

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

1. Solve: $x^3 \dfrac{d^3 y}{dx^3} + 2x^2 \dfrac{d^2 y}{dx^2} + 2y = 10x$.

2. Solve: $(5 + 2x)^2 \dfrac{d^2 y}{dx^2} - 6(5 + 2x)\dfrac{dy}{dx} + 8y = 6x$.

3. Solve $(D^2 + 1)y = \operatorname{cosec} x$ by the method of reduction of order.

4. Solve $(D^2 + 1)y = \sec x \tan x$ by the method of variation of parameters.

5. Solve $\dfrac{d^2 y}{dx^2} + \dfrac{dy}{dx}\tan x + y\cos^2 x = 0$ by the method of change of independent variable.

UNIT - V

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

1. Evaluate $L\{\sin kt \cdot \cos kt\}$.

2. Derive the formula $L\{f(t)\} = \dfrac{1}{1-e^{-sw}} \displaystyle\int_0^w e^{-s\beta} F(\beta)\, d\beta$ for Laplace transform of a periodic

   function with period w.
3. Express $F(t)$ in terms of α function and find $L\{F(t)\}$ if $F(t) = \begin{cases} t^2, & 0 < t < 2 \\ t-1, & 2 < t < 3 \\ 7, & t > 3 \end{cases}$.

4. Using Laplace transforms solve the differential equation

   $x''(t) + 4x'(t) + 4x(t) = 4e^{-2t};\ x(0) = -1,\ x'(0) = 4$.

5. A spring is such that a 2 pound weight stretches it $\dfrac{1}{2}$ ft. An impressed force $\dfrac{1}{4}\sin 8t$ is

   acting upon the spring. If the 2-pound weight is released from a point 3 inches below the

   equilibrium point, determine the equation of motion.

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G 503.5b(i)   Reg. No. :

St. Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
MATHEMATICS – Paper VI
DISCRETE MATHEMATICS

Time: 3 Hours   Max. Marks: 100
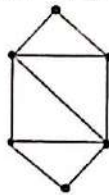
Note: Answer all parts

PART – A

Answer any <u>TEN</u> of the following.   (10×2½=25)

1. If $A = \{1,2,3\}$ write $P(A)$, Also find $|P(A)|$.

2. Define a lattice and give an example.

3. If repetitions are allowed, find the number of ways to choose three out of seven days.

4. Draw complete graphs K_n for $n \le 5$.

5. Define $K - factor$ of graph. Find a 2 factor of the following graph.

6. Define the terms rank and nullity of a graph. What is the rank of a connected graph of 12 vertices?

7. Prove that there is a unique path between every two vertices in a tree.

8. Write a prefix code corresponding to the following binary tree.
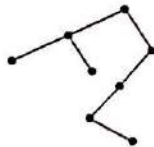
9. Draw any three spanning trees of the following graph.
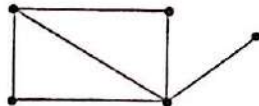
10. Write in tabular form the design of a modulo 3 sum of the digits 0,1,2 in the input signals.

11. Define a tractable and intractable problems. Give an example of a tractable problem.

12. Give an abstract model of a finite state machine.

13. Find the particular solution of the difference equation $a_r - 2a_{r-1} + a_{r-2} = 7$.

14. Write the numeric function corresponding to the generating function $A(z) = \frac{4}{1+2z}$.

                                                    Contd...2

15. Find the forward difference of the numeric function, $\begin{cases} 0, & 0 \leq r \leq 2 \\ 2^{-r} + 5 & r \geq 3 \end{cases}$.

PART – B

UNIT – I

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

1. Prove that set of all real numbers between 0 and 1 is uncountably infinite.
2. Explain the phrase structure grammar with examples.
3. Show that any integer composed of 3^n identical digits is divisible by 3^n.
4. In how many ways can a group of 8 people be divided into committees, subject to the constraint that each person must belong to exactly one committee and each committee must contain at least 2 people?

UNIT – II

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

1. Prove that there is always a Hamiltonian path in a directed complete graph.
2. For any connected planar graph, prove with usual notations that $v - e + r = 2$.
3. Let G be a linear graph with 'n' vertices. If the sum of degrees of each pair of vertices in G is $n - 1$ or larger, then prove that there exists an Hamiltonian path in G.
4. Prove that an undirected graph possesses an Eulerian path if and only if it is connected and has either zero or two vertices of odd degree.

UNIT – III

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

1. Define tree and leaf. Prove that a tree with two or more vertices has at least two leaves.
2. Define a Cut Set. Prove that every circuit has an even number of edges in common with every cut set.
3. Prove that a graph with $e = v - 1$ edges that has no circuit is a tree.
4. Describe an algorithm for determining a minimum spanning tree of a connected weighted graph.

UNIT – IV

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

1. Show that the language $L = \{a^K b^K | K \geq 1\}$ is not a finite state language.
2. When are the two states said to be $K-equivalent$? Illustrate with an example.
3. State the algorithm *LARGEST* 2 for finding the largest of the n numbers. Justify it with a formal proof.

G 503.5b(i)

4. Let L be the finite state language accepted by a finite state machine with N states. For any sequence α whose length is N or larger in the language, prove that α can be written as uvw such that v is non empty and $uv^i w$ is also in the language for $i \geq 0$ where v^i denotes the concatenation of i copies of the sequence v.

UNIT – V

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

1. Write the difference equation of the Fibonacci sequence and find its solutions.

2. Find the particular solution of $a_r + a_{r-1} = 3r2^r$.

3. Find the numeric function for the generating function $A(Z) = \dfrac{2 + 3Z - 6Z^2}{1 - 2Z}$.

4. Find the homogeneous solution of the difference equation,

    $a_r + 6a_{r-1} + 12a_{r-2} + 8a_{r-3} = 0$.

5. Obtain the numeric function $a * b$. where $a_r = 3^r, r \geq 0$ and $b_r = 2^r, r \geq 0$.

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Mangaluru
B.Sc. Semester V – Degree Examination
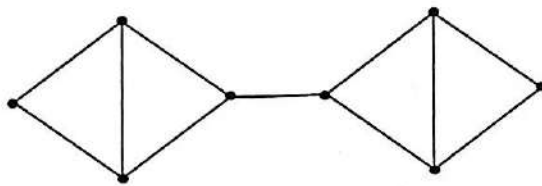### October – 2019
MATHEMATICS-PAPER VI
Graph Theory

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

PART –A

$(10 \times 2\frac{1}{2}=25)$

Answer any TEN of the following.

1. Construct a cubic graph on 10 vertices.

2. Define the terms i) Complete graph   ii) Union of two graphs

3. Show that the number of vertices in a binary tree is always odd.

4. Write the vertex connectivity and edge connectivity of the following graph:
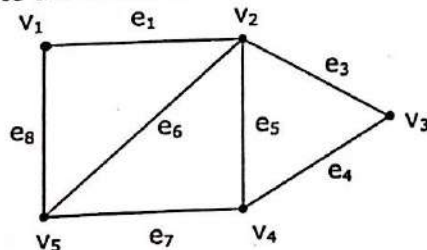

5. Define fundamental circuit with an example.

6. Define planar and non planar graphs with an example.

7. Define the cut-set matrix of a graph.

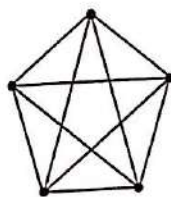8. Write the incidence matrix of the following graph
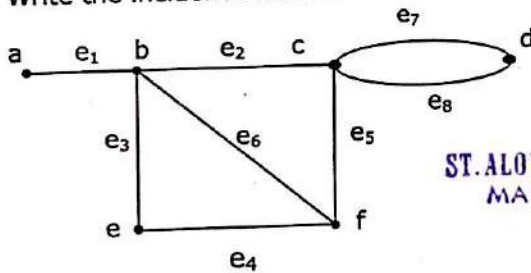
9. Write the circuit matrix of the following graph:

10. Define an independent set of vertices with an example.

11. Write the chromatic polynomial of the following graph:

G 503.5b (III)

12. Define strongly and weakly connected digraph.

13. Define Euler digraph with an example.

14. Define the terms :

    i)   Symmetric digraph

    ii)   Asymmetric digraph.

15. Define an arborescence with an example.

PART-B
Unit-I

(3×5=15)

Answer any THREE of the following.

1. Prove that a connected graph G is an Euler graph if and only if it can be decomposed into circuits.

2. If a graph has exactly two vertices of odd degree then prove that there exists a path joining these two points.

3. Prove that any connected graph with n vertices and (n-1) edges is a tree.

4. Prove that every connected graph has at least one spanning tree.

5. List all the fundamental circuits with respect to a chosen spanning tree of the following graph:
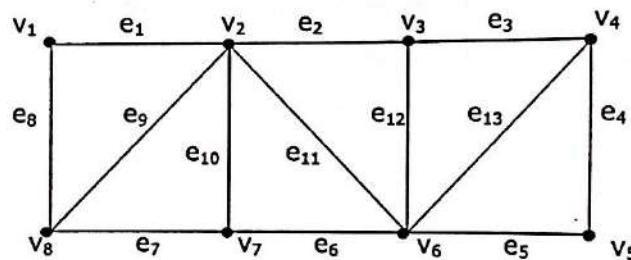
Unit II

Answer any THREE of the following.

(3 x5=15)

1. Prove that every circuit has an even number of edges in common with any cut-set.

2. With respect to a given spanning tree T, prove that a branch b_i that determines a fundamental cut-set S is contained in every fundamental circuit associated with the chords in S and in no others.

3. Prove that Kuratowski's second graph is non planar.

4. Prove that a connected planar graph with n vertices and e edges has e-n+2 regions.

5. Prove that a graph can be embedded in the surface of a sphere if and only if it can be embedded in a plane.

Unit III

Answer any THREE of the following.

(3 x5=15)

1. Prove that the ring sum of two circuits in graph G is either a circuit or an edge disjoint union of circuits.

2. Let B and A be the circuit matrix and the incidence matrix whose columns are arranged using the same order of edges, then prove that $A.B^T = B.A^T = 0 \pmod 2$.

3. Prove that the rank of the circuit matrix of a connected graph with e edges and n vertices is e-n+1.

4. Prove that the rank of the incidence matrix of a connected graph with n vertices is (n-1).

5. Write the adjacency matrix of the following graph.
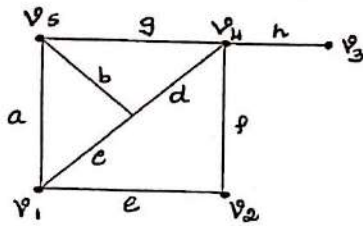
Unit IV

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

1. Prove that every tree T with two or more vertices is 2-chromatic.

2. Prove that a graph of n vertices is a complete graph if and only if its chromatic polynomial $P_n(\lambda) = \lambda (\lambda-1) (\lambda-2)\ldots\ldots(\lambda-n+1)$.

3. Prove that a graph with n vertices is a tree if and only if its chromatic polynomial $P_n(\lambda) = \lambda (\lambda-1)^{n-1}$.

4. Prove that a graph with at least one edge is 2 chromatic if and only if it has no circuits of odd length.

5. Find the chromatic polynomial of the following graph.
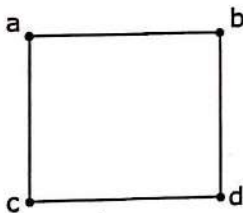
Unit V

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

1. Prove that a digraph G is an Euler digraph if and only if G is connected and is balanced

2. Prove that an arborescence is a tree in which every vertex other than the root has an in-degree of exactly one.

3. Show that the determinant of every square submatrix of the incidence matrix of a digraph is 1, -1 or 0.

4. Construct the nine vertex labelled tree corresponding to the sequence (1, 1, 1, 3, 5, 5, 9)

5. Prove that there are n^{n-2} labelled trees with n vertices (n≥2).

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(2007 batch onwards)

G 503.5b(iv)   Reg. No: [ ][ ][ ][ ][ ][ ]

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October – 2019
MATHEMATICS – Paper VI
LINEAR PROGRAMMING

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

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

1. Define i) line segment in R^n ii) norm of x in R^n.

2. Define canonical maximization LPP.

3. Pivot on $a_{11} = 3$ in the following Canonical maximization table.

x_1	x_2	-1	
3	2	1	$=-t_1$
6	1	3	$=-t_2$
9	2	0	$= f$

4. Define negative transpose of the minimum table.

5. Define complementary slackness in dual canonical LPP.

6. Transfer the data of the following non canonical maximization LPP into a maximum table.

   Maximize $f(x,y) = x + 3y$, subject to $x + 2y \leq 10, 3x + y \geq 15$

7. Reduce the following table of the matrix game using domination :

$$\begin{pmatrix} 2 & 1 & 4 & 2 \\ 1 & 2 & 1 & 1 \\ -2 & 6 & 3 & -2 \\ 3 & -3 & 5 & 1 \\ 1 & -2 & 2 & 1 \end{pmatrix}$$

8. Define mixed strategy and pure strategy for a column player of a matrix game.

9. State duality theorem.

10. State balanced transportation problem.

11. Convert the following unbalanced transportation problem into a balanced transportation problem:

3	2	1	30
2	5	9	75
40	30	50	

G 503.5b(iv)

12. Find all permutation set of zeros in the following table of balanced assignment problem.

0	0	0	0
4	1	0	1
0	2	0	0
1	0	0	0

13. Prove that any flow in a capacited directed network satisfies $\sum_j \phi(v_j) = 0$.

14. Define a cut, cutest and capacity of a cut in a capacited directed network.

15. State the shortest path network problem.

PART – B
UNIT - I

Answer any TWO questions. $(2 \times 7\frac{1}{2} = 15)$

1. Solve the following LPP graphically:

   Maximize : $f(x, y) = 30x + 50y$

   subject to $2x + y \leq 8$

   $x + 2y \leq 10$

   $x, y \geq 0.$

2. State the complete simplex algorithm for maximum table.

3. Solve using simplex algorithm

x_1	x_2	-1	
-1	-2	-3	$= -t_1$
1	1	3	$= -t_2$
1	1	2	$= -t_3$
-2	4	0	$= f$

4. Apply the Simplex algorithm to the following maximum table :

x_1	x_2	-1	
-1	1	1	$= -t_1$
1	-1	3	$= -t_2$
1	2	0	$= f$

UNIT - II

Answer any TWO questions. $(2 \times 7\frac{1}{2} = 15)$

1. State and prove duality equation.

2. Solve the following minimization LPP using simplex algorithm:

x	-1	-1	-1
y	-1	1	-1
-1	-2	1	0
	$= t_1$	$= t_2$	$= g$

3. Solve the noncanonical LPP :
   Maximize $f(x, y) = x + 3y$,
   Subject to $x + 2y \leq 10$
   $$3x + y \leq 15$$
   $$x \geq 0$$

4. Solve the dual canonical LPP :

	x_1	x_2	-1	
y_1	1	-1	-1	$= -t_1$
y_2	-1	-1	-1	$= -t_2$
-1	1	-2	0	$= f$
	$= s_1$	$= s_2$	$= g$	

UNIT - III

Answer any TWO questions   **(2×7½=15)**

1. Solve the dual non-canonical L.P.P :

	x_1	x_2	x_3	-1	
y_1	1	-1	1	-1	$= -0$
y_2	-1	-1	1	1	$= -t_1$
y_3	-1	1	1	1	$= -t_2$
-1	1	1	-1	0	$= f$
	$= 0$	$= 0$	$= s_1$	$= g$	

2. Find the Von Neumann value and the optimal strategy for each player in the matrix game:
$$\begin{bmatrix} -3 & 4 \\ 2 & -3 \end{bmatrix}$$

3. Find the Von Neumann value and the optimal strategy for each player in the matrix game:
$$\begin{bmatrix} -5/3 & 0 \\ 5 & -10/3 \end{bmatrix}$$

4. Solve the dual non canonical LPP:

	x_1	x_2	-1	
y_1	1	-1	-2	$= -0$
y_2	-2	2	-1	$= -t_1$
-1	0	1	0	$= f$
	$= 0$	$= s_2$	$= g$	

Contd...4

UNIT - IV

Answer any TWO questions   (2×7½=15)

1. State the transportation algorithm in solving a balanced transportation problem.

2. Solve the transportation problem:

2	1	2	40
9	4	7	60
1	2	9	10
50	60	30	

3. State the Hungarian algorithm to solving a balanced assignment problem.
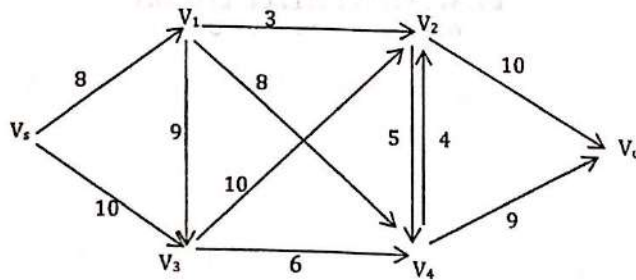
4. Solve the assignment problem below

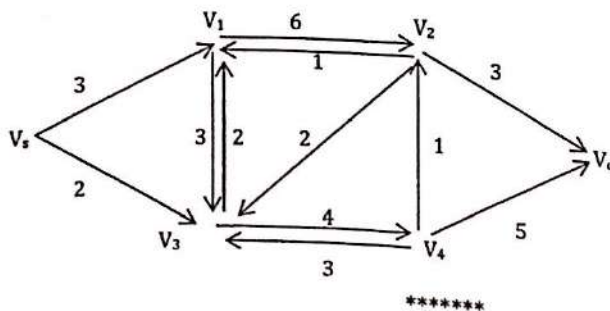|			
4	6	5	10
10	9	7	13
7	11	8	13
12	13	12	17

UNIT - V

Answer any TWO questions   (2×7½=15)

1. State the Maximal flow algorithm.

2. Solve the maximal flow network problem:

3. State the shortest path algorithm I.

4. Solve the shortest path network problem below by using Dijkstra's Algorithm. Also give the shortest path and the path value.

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(2015 Batch onwards)

Reg. No. ☐☐☐☐☐☐

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St Aloysius College (Autonomous) Mangaluru

B.Sc. Semester V – Degree Examination
October - 2019

ELECTRONICS - Paper V

Electronic Communication Systems

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) The number of scanning lines used in CCIR-B standard TV communication is --
      a) 525   b) 815   c) 625   d) 50

   ii) The term CVS stands for ----------
      a) Complete video signal   b) Composite video signal
      c) Carrier video signal   d) Complex video signal

   iii) The complementary colour of green is ---------
      a) Yellow   b) Cyan   c) Magenta   d) Purple

   iv) A material with indirect band gap is ----------
      a) GaAs   b) GaP   c) GaAsP   d) Crystalline Si

   v) The refractive index of the material of the core of an optical fiber is -------
      a) Greater than that of the cladding   b) Equal to that of the cladding
      c) Always 1   d) Less than that of the cladding

   vi) The term quantum efficiency as applied to an optical source is the ratio of ------
      a) Output current to input current
      b) Output optical power to input electrical power
      c) Output electrical power to input optical power
      d) Output current to input optical power.

   vii) PPM stands for ----------
      a) Pulse Position modulation   b) Pulse Phase modulation
      c) Pulse Plane modulation   d) Pulse Path modulation

   viii) In pulse communication if f_i is the highest frequency of the modulating signal, the minimum sampling frequency is f_s, then which of the following relations is correct?

      a) $f_s \leq f_i$ b) $f_s = \dfrac{f_i}{2}$ c) $f_s \geq 2f_i$ d) $f_s = f_i$

   ix) ----------- is a digital multiplexing scheme
      a) TDM   b) FDM   c) FDM+TDM   d) CDMA

   x) The word SIM stands for ---------
      a) Subscriber Identity model   b) Subscriber Identification module
      c) Subscriber Information module   d) Subscriber Identity module

   xi) ICP/IP represents ---------- in internet.
      a) Search engine   b) Protocol   c) Service   d) Domain

   xii) An internet is ----------
      a) Single network   b) Vast collection of different networks
      c) Interconnection of LANs   d) None of the mentioned above

(10x1=10)

2. Answer any <u>TEN</u> questions.

i) What is meant by aspect ratio?

ii) What is the time taken for tracing one line of a picture content in a frame?

iii) What is meant by compatibility of TV systems?

iv) Write the full form of LASCR.

v) What is a step index fiber?

vi) Mention the limitation of a LED as an optical source.

vii) Mention one difference between PAM and PWM.

viii) What is meant by CDMA?

ix) Mention any two differences between PAM and PPM.

x) What is a MODEM?

xi) Define a cell with reference to mobile communication.

xii) What is a domain?

3. Answer any <u>TEN</u> questions.   (10x2=20)

i) Mention any two advantages of negative modulation used in TV communication.

ii) Write a note on subtractive colour mixing.

iii) Mention any two advantages of optical fibers.

iv) What is a photo transistor? Write its electrical symbol.

v) Mention the key elements of CDMA.

vi) State and explain sampling theorem.

vii) Explain the characteristics of a laser diode used as an optical source.

viii) Write a note on "call handoff".

ix) Give the full form of

   i) NTSC   ii) PAL

x) What is a search engine? Give one example.

xi) Calculate the wavelength of light emitted from a LED, which uses a semiconductor of energy gap of 1.51 eV.

xii) Mention any two internet protocols.

SECTION – B

4. Answer any <u>SEVEN</u> questions.   (7x4=28)

i) For a TV channel in the frequency range (61-68)MHz, calculate the picture carrier frequency and sound carrier frequency. Also draw the channel diagram.

ii) Explain direct sequence spread spectrum used in CDMA.

iii) With a neat diagram, explain fiber optic communication link.

iv) Write a note on losses in optical fibers.

v) Explain any two applications of internet.

vi) With circuit diagram explain the application of LASCR in solid state relay. Explain its advantage over a mechanical relay.

vii) With diagram explain a colour TV camera tube.

viii) With a necessary diagrams, explain the generation and detection of pulse amplitude modulation (PAM)

ix) With block diagram, explain the process of outgoing call in GSM system.

x) Mention any four differences between monochrome and colour picture tubes.

SECTION – C

Answer any __THREE__ full questions.   (10x3=30)

5. a) With necessary diagrams explain
   i) Progressive scanning   ii) Interlaced scanning in television communication
   (6)

   b) With a neat diagram, explain a Plumbicon camera tube.   (4)

6. a) With necessary diagrams explain the principle of transmission of light through fibers and derive the expression for numerical aperture.   (6)

   b) With diagram explain a Avalanche photo diode (APD).   (4)

7. a) With circuit diagram explain the generation of PWM signals using monostable multivibrator   (6)

   b) With necessary diagrams explain a TDMA technique.   (4)

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

   b) Write a note on any two internet services.   (4)

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(2015 batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
ELECTRONICS – PAPER VI
8085 MICROPROCESSOR AND 8051 MICROCONTROLLER

Time: 3 hrs.   Max Marks: 100

Note : This question paper consists of 3 sections. Section A , Section B and Section C. Answer all the sections.

SECTION – A

1. Choose the correct answer from the choices given at the   (10x1=10) end of each question and write the correct answer.

   i) The instruction DAD D in 8085 μp adds the content of .... register.

      a)BC and DE   b) HL and DE   c) HL and BC   d) DC and BE

   ii) The 8051 micro controller has .... bit address and .... bit data lines.

      a) 16,16   b) 8,8   c) 16,8   d)8,16

   iii) LX1H F050H is a ....byte instruction.

      a) 2   b) 3   c) 1   d) 4

   iv) In MOVX A @ DPTR, X indicates data from .... memory.

      a) Internal   b) Onchip   c) ROM   d) External

   v) In 8085 microprocessor CMP instruction is used after ....

      a) to compare byte   b) Complement a byte

      c) To clear a byte   d) To branch to a label.

   vi) In indirect addressing mode of 8051 controller .... Registers are used to hold the address of internal RAM memory.

      a) R_1,R_2 b) R_0,R_1 c)R_0,R_7 d) R_2,R_0

   vii) ALE signal in 8051 controller is used to ....

      a) Latch the clock signals

      b) Latch the address from multiplexed address/data bus

      c) Latch the control signals

      d) Latch the logical signals

   viii) 8051 controller has .... register banks..

      a)2   b)3   c) 4   d) 5

   ix) The instruction JZ in 8051 controller checks the content/state of ....

      a) A   b) B   c) Zero Flag   d) R_0

   x) By default SP of 8051 points to ....location.

      a) 08h   b) 07h   c) 03h   d) 05h

   xi) Time delay required for one machine cycle in 8051 controller is ....for clock frequency of 11.059MHz.

      a)2µs   b)1.085µs   c)1.85µs   d)2.5µs

   xii) Among the following .... instruction is used for unconditional jump in 8051µC.

      a)SJMP   b)JZ   c)JNC   d)JC

2. **Answer any TEN of the following.** (1x10=10)

i) Mention the role of $\overline{INTA}$ signal in 8085μP.

ii) Which is the non maskable interrupt in 8085μP?

iii) Mention the role of parity flag in 8085μP.

iv) How many registers are available in each bank of 8051μC?

v) Which addressing mode is used to access the stack in 8051 controller?

vi) Which register of 8051controller is used to enable the interrupts?

vii) Which memory is used as stack in 8051 controller?

viii) Mention the instruction used to interchange the nibbles, of accumulator in 8051 controller?

ix) Which port of 8051 controller used as purely address bus?

x) Mention the function of RETI instruction in 8051μC.

xi) What is interrupt vector table?

xii) Give one example for immediate addressing mode in 8051 controller.

3. **Answer any TEN of the following.** (2X10=20)

i) Give the contents of H,L,D and E register after execution of following instructions.

LX1H 7050

LX1D 6080

XCHG

HLT

ii) Write any two 8085 instructions to clear the accumulator.

iii) Explain the role of signal HOLD signal in 8085μP.

iv) Explain the importance of RS_0 and RS_1 bits of PSW in 8051 controller.

v) Write any two differences between microcontroller and microprocessor.

vi) Explain the role of DPTR register during indirect addressing mode in 8051 controller.

vii) Distinguish between XCH A and SWAP A instructions of 8051 controller.

viii) With example explain any one bit handling instruction of 8051μC.

ix) With example explain DIV instruction in 8051 controller.

x) With example explain how bit addressable memory is accessed in 8051 controller.

xi) With example explain how relative address is calculated in 8051 controller.

xii) Mention any two differences between μP and μC.

SECTION B

4. **Answer any SEVEN of the following.**

(4X7=28)

i) Write a 8085 program to add two bytes stored in location F000H and F001H. Store the result in F002H.

ii) With example explain how stack is accessed while calling a subroutine in 8085μp?

iii) With example explain any Two addressing modes in 8085μP?

iv) With an example, explain how required delay is generated in 8051μC using Timers.

v) With diagram explain how internal memory is organized in 8051 controller?

vi) Write a 8051 program to clear the content of 5 memory locations starting from the memory locations 30h.

vii) Write a 8051 delay program to generate 2ms delay.

viii) With bit pattern diagram, explain IE register of 8051 controller.

ix) Write a 8051 program to find largest of two numbers stored in locations 40H and 41H and store the result in 42H.

x) Write a program to multiply two 8-bit numbers in 8051μC.

SECTION C

Answer any <u>THREE</u> full questions.   **(3x10=30)**

5.a) With bit pattern explain the flag register of 8085μP?   **(5)**

b) Draw the pin diagram of 8085μp and explain the functions of various pins.   **(5)**

6.a) Explain the interrupts of 8051μC.   **(5)**

b) With syntax and example explain the following instructions of 8051 controller.   **(5)**

   i) JZ   ii) ACALL

7.a) With necessary diagram explain how a keyboard is interfaced to 8051 controller?   **(5)**

b) With example explain any two logical instructions in 8051 controller.   **(5)**

8.a) With syntax and example explain the following 8051 instruction   **(5)**

   i) SBB   ii) RLC

b) Write a note P₀ Port in 8051 controller.   **(5)**

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G 505.5a   Reg. No. : ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangalore
B.Sc. Semester V - Degree Examination
October - 2019
COMPUTER SCIENCE Paper V
RDBMS using Oracle

Time: 3 Hours   Max. Marks: 100

PART– A

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

1. a) What is data model? Mention its types.

   b) Name the operators used for

      i) range searching   ii) pattern matching

   c) Differentiate between procedure and function in PL/SQL.

   d) What is primary key in database? Explain with example.

   e) List the different DDL commands in SQL.

   f) What do you mean by recursive relationship in database?

   g) Explain on DELETE CASCADE option in oracle.

   h) Define: i) Enitity type   ii) Relationship set.

   i) What is data independence?

   j) What is a stored procedure?

   k) Define 2NF.

   l) What are exceptions?

PART - B

Answer any ONE FULL question from each unit in PART B

UNIT – I

2. a) Explain two tier and three tier architecture with neat diagrams.   (6)

   b) Explain the characteristics of data base management system.   (5)

   c) Explain the different symbols used in E-R diagram.   (5)

   d) Write a note on : i) Data redundancy   ii) Data recovery.   (4)

3. a) Explain the different types of database users.   (5)

   b) Write the advantages of DBMS over file systems.   (5)

   c) Write a note on database languages.   (5)

   d) Explain the following terms: i) Composite attribute   ii) Derived attribute   (5)

UNIT - II

4. a) Write Armstrong's rules.   (6)

   b) What does the term normalized relation refer to? How did the normal form develop historically from first normal form upto BOYCE-CODD normal form.   (6)

   c) Describe the properties of SELECT and PROJECT operations.   (4)

   d) Explain equi join and theta join with example.   (4)

5. a) List the operations of relational algebra and explain the purpose of each. (5)

    b) Explain the various types of inner join operations. (5)

    c) Explain the following:

        i) Functional dependency

        ii) Equivalence of two sets of functional dependencies. (5)

    d) Explain entity integrity and referential integrity constraints. (5)

UNIT - III

6. a) Explain any two types of data constraints with examples. (6)

    b) Explain the basic structure of oracle system. (5)

    c) Explain the various clauses of SELECT statement with example. (5)

    d) Consider the following relation schema.

        Employee (Eno, Ename, Dob, Dno, salary

        Department (Dno, Dname, Manager) (4)

        Write the SQL querries for the following

        i) Display Eno, Ename, Dname and Manager for all employees.

        ii) Display Dname, total and average salary of each department.

7. a) Explain any five aggregate functions with example. (5)

    b) Explain: i) Commit   ii) Rollback   iii) Save point (5)

    c) Explain the oracle statements to add and drop integrity constraints to/from a table. (5)

    d) Explain subquerry and join in SQL with example. (5)

UNIT - IV

8. a) What is a view? Explain with syntax and example how it is created? (5)

    b) With the help of an example, explain for and while loops in PL/SQL. (5)

    c) What is cursor? Explain the different types. (5)

    d) Write a function in PL/SQL to find he cube of a given number. Using this function write a PL/SQL program to display the cube of first 100 numbers. (5)

9. a) Explain the attributes of a cursor with example. (5)

    b) Write the advantages of functions in oracle. (5)

    c) What is a procedure? Differentiate between procedures and functions. (5)

    d) Consider the table STUDENT (Rno, name, m1, m2, m3, total, percent, grade).

        Write a cursor program to calculate the total, percentage and grade for all students. (5)

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(2015 batch onwards)

G 505.5b1

Reg. No.

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October- 2019
COMPUTER SCIENCE - Paper VI
Operating System and Linux

Time: 3 hrs.

Max Marks: 100

PART-A

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

1. a) Mention any four different types of operating systems.

    b) Define a context switch.

    c) What is PCB? Mention any four fields of PCB.

    d) Differentiate between waiting time and turnaround time.

    e) Define a semaphore.

    f) Write two methods of recovery from a deadlock situation.

    g) What is physical address space?

    h) Differentiate between paging and segmentation.

    i) Define virtual memory.

    j) What is the purpose of ls command in Linux.

    k) List the string operators and their meaning in Linux.

    l) Give the syntax and purpose of 'grep' command in Linux.

PART-B
Answer any ONE full question from each unit.
Unit I

2. a) What is a process? With a neat diagram explain the different states of a   (8)
    process.

    b) List and explain the different services of operating system.   (6)

    c) List and explain the benefits of multithreading.   (6)

3. a) Explain the following: (8)

    i) Time sharing system
    ii) Real time operating system.

    b) Mention and explain different threading models.   (6)

    c) Explain queuing diagram representation of process scheduling.   (6)

Unit II

4. a) What is a critical section? What are the requirements of a solution to   (8)
    the critical section problem? Explain.

    b) Explain the Round Robin scheduling algorithm.   (6)

    c) Explain any two types of semaphores.   (6)

G 505.5b1

5. a) Explain FCFS and SJF CPU scheduling policies with examples. (8)

   b) Explain Peterson's solution for critical section problem. (6)

   c) Explain the readers and writers problem. (6)

Unit III

6. a) What is first-in-first-out (FIFO) page replacement? With three frames (8)
   of memory and the page reference string

   7,0, 1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1 write down the steps to find
   the number of page faults using FIFO page replacement.

   b) Explain Banker's algorithm for deadlock avoidance. (6)

   c) What is resource -allocation graph? Explain with an example how it (6)
   can be used to represent a deadlock situation.

7. a) Explain deadlock recovery techniques and deadlock detection methods. (8)

   b) Compare and contrast swapping and demand paging. (6)

   c) List and explain the necessary conditions for a deadlock to occur. (6)

Unit IV

8. a) Explain the different forms of if statements in Linux with example. (8)

   b) Explain the following commands in Linux operating system with an (6)
   example.

   i) cat   ii)chmod   iii) wc   iv) mkdir

   c) Write a shell script to generate Fibonacci numbers up to N. (6)

9. a) Explain the case control structure available in Linux with syntax and (8)
   also write a case structure to check the small case letters, capital
   letters, digits and special characters.

   b) Write a note on vi editor and positional parameters in Linux. (6)

   c) Explain the 'while loop' and 'for loop' with syntax and example. (6)

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(2016 Batch onwards)

G 506.5a   Reg. No:

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

STATISTICS – PAPER V
Design of Experiments

Time: 3 Hours   Max. Marks: 100

Note: Answer all parts

PART – A

1. Answer any <u>TWELVE</u> of the following.   (2×12=24)

a) Explain analysis of variance.

b) State Cochran's theorem.

c) Give the model for one way classified data and explain the components.

d) Write the ANOVA table of two way classification.

e) Write the advantages of CRD.

f) Give the layout of an RBD with 4 treatments and 5 blocks.

g) Give one practical example for LSD.

h) Define the term treatment with an example.

i) Write any two disadvantages of LSD

j) Write down an expression for a missing observation in RBD.

k) What is meant by efficiency of design?

l) What are factorial experiments?

m) Mention the advantages and disadvantages of factorial experiments.

n) Define contrast with an example.

o) Define main effects and interaction effects in a factorial experiment.

PART – B

Answer any <u>SIX</u> of the following.   (6×6=36)

2. Derive the expected value of error sum of squares in a three way layout.

3. Explain the terms randomization and local control in designs of experiments.

4. Explain the following terms with examples.

   i) Experimental unit   ii) Experimental error.

5. Explain the procedure of testing the equality of any treatment effects in a CRD.

6. Derive the expression for one missing observation in LSD.

7. Explain randomized block design. Mention its advantages and disadvantages.

8. Derive an expression for the efficiency of RBD with respect to LSD.

9. Show that main effects and interaction effects in a 2^2 factorial experiment are mutually orthogonal contrast.

10. Describe Yate's method of computing factorial effect totals in a 2^3 factorial experiment.

PART – C

Answer any <u>FOUR</u> of the following.

(10×4=40

11. Explain the analysis of variance for a two way classification and hypotheses that are tested. Also write down ANOVA table.

12. Define CRD. Split the components of total sum of squares and write down the degree of freedom for various components.

13. Explain the analysis of LSD stating the mathematical model.

14. Derive the expression for two missing observations in LSD.

15. Give the analysis of a 2^2 factorial experiment. Derive the expressions for the main effects and the interaction effects.

16. Give the analysis of a 2^3 factorial experiment conducted in RBD.

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(2016 Batch onwards)

G 506.5b

Reg. No: ☐☐☐☐☐☐

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

STATISTICS – PAPER VI
Total Quality Management

Time: 3 Hours

Max. Marks: 100

Note: Answer all parts

PART – A

1. Answer any <u>TWELVE</u> of the following.   (2×12=24)

   a) What are the chance causes of variation in quality?

   b) Explain quality taken as a variable with an example.

   c) When the process is said to be under control?

   d) What are 3σ limits?

   e) Distinguish between defect and defective.

   f) Explain the terms AQL and PR.

   g) Explain the procedure of SSP by variables when upper specification limit is given and SD is unknown.

   h) What is product control?

   i) Mention any two uses of acceptance sampling.

   j) What is indifference quality?

   k) What is the meaning of OC curve for SSP by attributes?

   l) Write down the AOQ for SSP by attributes.

   m) What are modified control limits?

   n) Write down the control limits for number of defective chart.

   o) Define LTPD.

PART – B

Answer any <u>SIX</u> of the following.   (6×6=36)

2. Explain the role of control charts in process control and describe control charts with an without standards.

3. Discuss the difference between specification limits and natural tolerance limits.

4. Under what circumstances do you modify the control limits for the $\overline{X}$ charts? How do you obtain modified control limits?

Contd ...2

G 506.5b

5. Explain the possible actions that may be taken when the spread of the process differ from $U - L$ considerably.

6. What are the objectives of SQC?

7. Obtain the control limits for $\overline{X}$ and R charts when standards are given.

8. Derive the control limits for the U – chart stating the assumptions.

9. Deduce an expression for OC function in SSP by attributes.

10. Mention merits and demerits of variable sampling plan.

PART – C

(10×4=40)

Answer any FOUR of the following.

11. a) Explain the need for rational subgroups. What are the criteria behind the selection of rational subgroups.

    b) What actions do you suggest when the specification limits lie outside the control limits?

    (5+5)

12. a) Stating the assumptions derive the control limits of C-chart.

    b) Outline the steps in the construction and analysis of a p-chart.

    (5+5)

13. a) What are the characteristics of a good sampling plan?

    b) Explain the significance of 3σ limits in control chart theory.

    (5+5)

14. How do you construct SSP for attributes when PR, CR, AQL and LTPD are given?

15. Derive an expression for OC function of SSP by variables when lower specification limit L is given and σ is unknown. From OC how do you find PR when AQL is given?

16. a) What is the need for quality control in large scale production process?

    b) Explain the method of construction of SSP by attributes minimizing ATI for a given lot quality and a point on the OC curve.

    (5+5)

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(2013 Batch only)

G. 507.5a

Reg. No: ☐☐☐☐☐☐

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

October - 2019

BOTANY – Paper V
Environmental Studies

Time: 3 Hours   Max. Marks: 100

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

SECTION – A

I. Answer any <u>TEN</u> of the following in a few sentences each. (2x10=20)

1. What is a food chain?
2. What are hot spots of biodiversity? Give two examples.
3. Mention the role of detritus organisms in an ecosystem. Give two examples.
4. What is 'IN SITU' conservation? Mention its advantages.
5. What are nest epiphytes? Give an example.
6. What is retrogressive succession? Give one example.
7. Write any two physiological characters of xerophytes.
8. What is ecolabelling scheme and green marketing?
9. Define sustainable development.
10. Write briefly the case study of Rajasthan for water conservation.
11. What is consumerism? Write any two effects of it.
12. Define nudation and ecesis.

SECTION – B

II. Answer any <u>SIX</u> of the following.   (6x5=30)

1. Explain any one terrestrial ecosystem.
2. Give an account on coastal and desert regions.
3. Explain the scope and importance of environmental studies.
4. Give an account on morphological adaptations of any five hydrophytes giving suitable examples.
5. Explain the different stages of development of vegetation on a bare rock.
6. Give an account on anatomical adaptations of halophytes.
7. Explain the measures to be taken for conserving the energy.
8. Give an account on need for environmental ethics.
9. Write the problems associated with rehabilitation.

SECTION – C

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

1. What are ecological pyramids? Explain their types with suitable examples.
2. Mention the importance of biodiversity conservation.
3. Write short notes on
   a) Energy flow in the ecosystem
   b) Global environmental issues
4. Describe the anatomical adaptations of xerophytes with suitable examples.
5. Explain the succession in a pond with a labeled diagram.
6. Write short notes on
   a) Vivipary
   b) Pneumatophores
   c) Epiphytic roots
   d) Primary succession
   e) Invasion giving suitable examples.
7. Explain the practices to be adopted for conservation of water.
8. Write short notes on
   a) Global warming
   b) Nuclear accidents
9. Explain the approaches of wasteland reclamation.

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(2014 batch onwards)

G. 507.5b

BOTANY – Paper VI
MOLECULAR BIOLOGY I & GENETICS

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. Give any two differences between B-DNA and Z-DNA.

2. What is a cistron?

3. Mention the significance of Okasaki fragments in DNA replication.

4. What are elongation factors? Name the prokaryotic elongation factors.

5. Define alleles.

6. What is test cross? Mention its significance.

7. What is linkage? Name the types.

8. Define law of purity of gametes.

9. What is chromosomal theory of sex determination? Give an example.

10. Mention any two significances of polyploids in plant breeding.

11. What are lethal mutations? Give examples.

12. What are base analogues?

SECTION – B

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

1. Write a note on plastid DNA and its functions.

2. What is degeneracy of the triplet codons? Explain with suitable examples.

3. Explain briefly the mechanism of eukaryotic transcription.

4. Explain the mechanism of crossing over.

5. What is complementary interaction? Explain with the help of a plant example.

6. Explain the inheritance of incompletely dominant alleles with a suitable example.

7. Discuss the effect of physical mutagens on DNA.

8. Explain the mechanism of frame shift mutations.

9. What is aneuploidy? Mention the types with examples.

SECTION – C

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

1. Explain how Meselson and sthal proved the semi conservative nature of DNA replication.

2. Give the sequential steps of activation of amino acids and formation of 70s initiation complex.

3. Explain the Watson & Crick model of DNA.

4. State and explain the law of independent assortment of factors with the help of a dihybrid cross.

5. What are duplicate genes? Explain with the help of a plant example.

6. Write short notes on

   a) Self sterility alleles   b) Linkage maps.

7. Give an account of gene-controlled mechanism of sex determination in plants.

8. Discuss the role of allopolyploidy in plant speciation with suitable plant examples.

9. Explain the process of translocation. Add a note on its cytological consequences.

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(2014 Batch onwards)

G.508.5a   Reg. No.: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
ZOOLOGY – PAPER V
HISTOLOGY, REPRODUCTIVE AND
DEVELOPMENTAL BIOLOGY

Time: 3Hours.   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 microtomy? Mention any two significances.

b) What is double staining? Give an example.

c) What are gastric glands? Where are they located?

d) Give two similarities between oogenesis and spermatogenesis.

e) Write a note on polyspermy.

f) List any two hormones used for fertility control. Give their functions.

g) What are germ layers? Give one derivative of each layer.

h) Describe frog egg.

i) Give any four functions of chorion.

j) List any two placental hormones with their function.

k) What is super ovulation?

l) Give the significance of dorsal lip of blastopore.

PART – B

Select ONE full question from each unit.

Unit I

II a) Explain the histological structure of ovary.   (10)

b) Discuss the localization of proteins.   (5)

c) Describe the steps involved in paraffian block preparation.   (5)

OR

III a) Explain the histological structure of pancreas.   (10)

b) Describe the structure of hepatic lobules.   (5)

c) Write a note on haematoxylin-eosin staining technique.   (5)

Unit II

IV a) Give an account of natural parthenogenesis.   (10)

b) Explain menstrual cycle in humans.   (5)

c) Draw a neat labeled diagram of human egg.   (5)

OR

V a) With respect to fertilization, explain-   (10)
        i) Acrosomal reaction   ii) cortical changes

b) List the secondary sexual characters in human females.   (5)

c) Comment on intra uterine devices.   (5)

Unit III

VI a) Explain organogenesis with reference to notogenesis and neurogenesis in frog.   **(10)**

b) With a neat labeled diagram, explain the fate map of chick.   **(5)**

c) Write a note on epigenetic theory.   **(5)**

OR

VII a) With reference to gastrulation in chick, explain-   **(10)**
   i) Formation of endoderm
   ii) Formation of primitive streak

b) Describe the structure and functions of amnion.   **(5)**

c) Describe a neat labeled diagram of 24 hours chick embryo.   **(5)**

Unit IV

VIII a) Give an account of Brachets and Spemanns experiment to demonstrate organizer phenomenon.   **(10)**

b) What is implantation? Explain the process of implantation in humans **(5)**

c) Write a note on artificial insemination.   **(5)**

OR

IX a) Define cryopreservation. Explain its significance in reproduction. **(10)**

b) Describe the steps involved in animal cloning.   **(5)**

c) Write a note on twins and multiple births.   **(5)**

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(2014 Batch onwards)

G.508.5b Reg. No.: ☐☐☐☐☐☐

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
ZOOLOGY – PAPER VI
ENVIRONMENTAL BIOLOGY, BIOSTATISTICS AND WILDLIFE BIOLOGY

Time: 3Hours. 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 diapause? How is it controlled by light?

b) Explain mutualism with an example.

c) Define an estuary.

d) What are Eltonian pyramids?

e) Define food chain. Give an example.

f) What is limiting factor? Name any two.

g) What is acid rain?

h) What is standard deviation? Write the formula.

i) What is Wallace's line?

j) Write a note on keystone species.

k) What is "Red data book"?

l) Name two National parks of Karnataka.

PART – B

Select ONE full question from each unit.

Unit I

II a) Define abiotic factor. Explain light as an abiotic factor. (10)

b) Explain food web with a schematic illustration. (5)

c) Write notes on commensalism with examples. (5)

OR

III a) Give an account of types of ecosystem with reference to natural and man made ecosystems. (10)

b) Write short notes i) Thermal stratification ii) Extremes of temperature. (5)

c) With an illustration explain pyramid of biomass. (5)

Unit II

IV a) Give an account of ecological classification of marine biota. (10)

b) Write an explanatory note on age distribution. (5)

c) Explain the process of ecological succession. (5)

G.508.5b

OR

V a) What are ecological niches? Explain the different types of ecological niches. (10)

b) Explain the population growth forms with growth curves. (5)

c) Explain desert biome and grassland biome with reference to climatic conditions and fauna. (5)

Unit III

VI a) Define Pollution. Explain sources, effects and control of water pollution. (10)

b) Write a note on Liebeg's law of minimum. (5)

c) Explain the different types of graphical representation of data. (5)

OR

VII a) Write explanatory note on – a) Mode   b) Median   c) Mean (10)

b) Write notes on   i) BOD   ii) Biomagnification. (5)

c) Write explanatory notes on *el nino* and *la nino*. (5)

Unit IV

VIII a) Give a detailed account of threats to wildlife. (10)

b) Give an account of wildlife in tropical rain forest. (5)

c) Explain the oriental realm with reference to climatic conditions and characteristic fauna. (5)

OR

IX a) Define zoogeographical realms of the world. Explain Australian realm with reference to climatic condition and characteristic fauna. (10)

b) Give an account of wildlife in peninsular region. (5)

c) Write note on endangered species of India. (5)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
MICROBIOLOGY – PAPER V
MEDICAL MICROBIOLOGY & IMMUNOLOGY

Time: 3Hours.   Max Marks: 100

Instructions: Answer PART A AND B AND C

Draw Diagrams wherever necessary.

PART – A

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

a) Nosocomial Infections

b) Super Antigens

c) Adjuvant

d) Vaccine

e) Exotoxins

f) Allotype

g) Interferon

h) Epidemiology

i) Virulence

j) Haptens

k) Null Cells

l) B Cells

PART – B

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

UNIT -I

2. a) Describe the mechanisms of innate immunity.

OR

b) Describe the methods of transmission of infections.   (9)

c) Write a note on active immunity.   (6)

UNIT -II

3. a) Describe the different classes of immunoglobulins.

OR

b) Describe the structure of an immunoglobulin molecule.   (9)

c) Write a note on antigenic specificity.   (6)

UNIT -III

4. a) Describe the cellular immune response.

OR

b) Explain the structure and functions of peripheral lymphoid system.   (9)

c) Write a note on the factors influencing antibody production.   (6)

UNIT –IV

5. a) Describe the morphology, pathogenesis and laboratory diagnosis of dermatophytes.

OR

b) Describe the pathogenesis, laboratory diagnosis and control of polio.   (9)

c) Write a note on antibiotic resistance.   (6)

PART – C

Answer any <u>FOUR</u> of the following.   (5x4=20)

6. a) Thymus

b) Cytokines

c) Staphylococcal toxins

d) Classes of antigens

e) Pathogenesis of Salmonella

f) Kirby Bauer method

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(2014 Batch Onwards)

G 509.5b

Reg. No.: [ ][ ][ ][ ][ ]

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
MICROBIOLOGY – PAPER VI
PLANT MICROBIOLOGY AND BIOREMEDIATION

Time: 3Hours.   Max Marks: 100

Instructions: Answer PART A AND B AND C

Draw Diagrams wherever necessary.

PART – A

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

   a) Azolla

   b) Tabtoxins

   c) SOM

   d) Inulin

   e) Nodule

   f) Sandal Spike Disease

   g) PCBS

   h) Humic Acid

   i) Biofertilizer

   j) Flavonoids

   k) Biostimulation

   l) Composting

PART – B

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

UNIT -I

2. a) Explain in detail about Azotobacter biofertilizer.

   OR

   b) Explain in detail about BGA biofertizer.   (9)

   c) Write briefly on biocontrol of bacteria-mediated frost injury.   (6)

UNIT -II

3. a) Explain in detail Koleroga of arecanut.

   OR

   b) Explain in detail Tikka disease of groundnut.   (9)

   c) Write a short note on microbial toxins in plant disease.   (6)

UNIT -III

4. a) Explain about the biodegradation of pesticides.

   OR

G 509.5b

b) Explain the environmental factors affecting biodegradation. (9)

c) List the advantages and disadvantages of bioremediation. (6)

UNIT –IV

5. a) Explain in detail the microbiology of Cellulose degradation.

OR

b) Explain about Vermicomposting. (9)

c) Write briefly about the effects of humus on plant growth. (6)

PART – C

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

6. a) Soil sickness
   b) Biomagnification
   c) Symbolic nitrogen fixation by Rhizobia
   d) Biocontrol of diseases of aerial plants with bacteria
   e) Host specific toxins
   f) Enzymes in plant disease

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(2013 batch onwards)

G 510.5a

Reg. No: ☐☐☐☐☐☐

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

BIOCHEMISTRY – Paper V
Molecular Biology

Time: 3 Hours

Max. Marks: 100

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

PART – A

Answer any TEN of the following.

(10x2=20)

1. a) What is Cot curve?
   b) Write the reaction. When DNA treated with alkali?
   c) What are Ribozymes? Mention its functions.
   d) Why lagging strand replication is discontinuous?
   e) What are promoters?
   f) Genetic code is comaless and continuous. Give reason.
   g) What are non-sense codons? Write their names.
   h) As a mutagens, what is the effect of HNO_2?
   i) What is frame shift mutation? Give example.
   j) What are introns and exons?
   k) Describe the functions of restriction endonucleace?
   l) How tetracycline inhibit translation?

PART – B

Answer any SIX of the following.

(6x5=30)

2. With neat labelled diagram explain Watson & Crick model of DNA.
3. Write a note on TMV.
4. Explain Khorana's experiment.
5. What is splicing mechanism? Explain.
6. Explain Lac-Operon concept.
7. Write a note on Holliday model.
8. Explain glycosylation as post translational modification.
9. Explain DNA repair mechanism by photolyases.

PART – C

Answer any FIVE of the following.

(5x10=50)

10. With a neat labelled diagram explain the different structures of chromosome.
11. Write the structure and functions of different types of RNA.
12. Explain mechanism of translation in prokaryotes.
13. Explain steps involved in transcription of prokaryotes.
14. Explain any two types of gene transfer in bacteria.
15. Explain DNA replication with diagram.
16. Define mutation. Explain various types of mutation and mutagens with example.

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(2013 batch onwards)

G 510.5b

Reg. No:

St. Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
BIOCHEMISTRY – Paper VI
Biotechnology, Food and Industrial Biochemistry

Time: 3 Hours   Max. Marks: 100

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

PART – A

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

1. a) Name any two growth regulators in plants.

   b) What is batch culture technique? Give an application.

   c) Write any two applications of genetic engineering.

   d) What are Ti plasmids? Name any one application.

   e) What are cryoprotectants? Give any one example for cryoprotectant.

   f) Name any two methods used in food preservation. Give its applications.

   g) What are secondary metabolites? Give any two functions.

   h) Give any two applications of western blotting.

   i) Give any two applications of BT cotton.

   j) What is electroporation technique? Give its applications.

   k) Define the term "fermentation". Name any two applications.

   l) Define tissue culture. Name the types of plant tissue culture.

PART – B

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

2. Write a note on Southern blotting technique.

3. Write a note on single cell protein.

4. Explain the methods of preservation and storage of green leafy vegetables and grains.

5. Explain the methods and applications of cryopreservation.

6. Write a note on *Agrobacterium* mediated gene transfer and its importance in biotechnology.

7. Explain the role of micro, macro nutrients and pH in tissue culture.

8. Explain the production of vitamins using fermentation technology.

9. Explain the principle and isolation methods of protoplast.

PART – C

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

10. Explain transformation and add a note on characteristics of pBR322.

11. Write a note on food poisoning and intoxication.

12. Explain the methods for production of any one alcoholic beverage and amino acid.

13. Write a note on restriction endonuclease. Mention its importance in DNA cloning.

14. Explain the physical and chemical methods used for determining the constituents of foods.

15. Describe the principle and applications of PCR.

16. Give an account on gene therapy.

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G 511.5a   Reg. No. :

St Aloysius College (Autonomous)
Mangaluru
B. Sc. Semester V - Degree Examination
October - 2019
BIOTECHNOLOGY –PAPER V

Plant 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:**   (2×10=20)

a) Mention two applications of Gibberllic acid.

b) Define Callus and mention types.

c) List out the important applications of somatic embryogenesis.

d) Write the role of Fe-EDTA in plant tissue culture.

e) Give the composition of PVS medium.

f) What is meant by electrofusion?

g) Define secondary metabolite with important types.

h) Define mitotic index.

i) Write the principle involved in virus elimination through heat treatment method.

j) Mention important markers used in selection of transformants.

k) Differentiate between genetic and eqigenetic variations.

l) Define edible vaccines. Give two examples.

PART – B

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

2. Write a note on BT cotton.

3. Give an account on protoplast isolation from intact leaves.

4. Describe on history of plant tissue culture.

5. Explain on Meristem culture.

6. Discuss on androgenic haploid production.

7. Explain the mechanisms involved in generation of variants.

8. Describe the structure of *Agrobacterium tumefaciens*

9. Write a note on pollen culture.

10. Give an account on auxins.

PART – C

Answer any <u>FIVE</u> of the following: (10x5=50)

11. Discuss on cryopreservation.

12. Explain the various factors affecting virus eradication by meristem tip culture.

13. Give an account on selection of hybrid cells.

14. Explain in details on single cell culture, types and growth kinetics.

15. Explain cytodifferentiation in detail.

16. Explain on tissue culture media.

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(2014 Batch onwards)

G 511.5b   Reg. No:

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
October - 2019
BIOTECHNOLOGY – PAPER VI
ANIMAL 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) Explain PDT. Write one significance.

b) Mention any two antibiotic resistance markers.

c) Write one advantage and disadvantage of polystyrene culture flask.

d) Give any two limitations of cloning.

e) Define cell strain with an example.

f) Give any two applications of growth factors.

g) Mention any two properties of hybrids.

h) What are pluripotent stem cells? Give one example.

i) Write any two examples for cryoprotectants used in cryopreservation.

j) Give any two applications of transgenic animals.

k) Write any two methods of transfection.

l) Mention any two heterologous proteins produced by silkworms.

PART – B

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

2. Give an account of ovarian transplantation.

3. Write a short note on trypan blue dye exclusion test.

4. Explain therapeutic cloning.

5. Explain the steps involved in routine maintenance of cell lines.

6. Comment on MTT assay.

7. Give an account of DNA micro array technique.

8. Comment on beneficial equipments used in cell culture.

9. Explain the method of insulin production through genetic engineering.

10. Write short notes on plasma clot and grid method of organ culture.

PART – C

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

11. Write a detailed account of dilution cloning and suspension cloning.

12. How transgenic animals are created? Explain with an example.

13. What is immnostaining? Explain the methods used.

14. Give a detailed account of mechanisms of cell differentiation.

15. Explain the production of monoclonal antibodies in detail.

16. Define cell synchronization. Explain the methods.

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(2016 Batch onwards)

G 513.5a   Reg. No. :

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER V – Degree Examination
October - 2019
ECONOMICS – Paper V
DEVELOPMENT ECONOMICS

Time: 3 hrs.   Max Marks: 100

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

1. Find out HDI from the following values.

Indicator	Value
Life expectancy at Birth (years)	75.0
Expected years of Schooling (years)	13.9
Mean years of Schooling (years)	12.2
Gross National Income percapita (2011 PPP $)	8,856

2. What are linkage effects?

3. What are the arguments for low capital-output ratio in UDCs?

4. Write a note on Pa Sinetti model of profit and growth.

5. What are the strategies for man power planning?

6. Write a note on 'Labour-intensive' and 'Capital- intensive' techniques.

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

7. Find out Gender Inequality Index from the following table.

	Health		Empowerment		Labour Market
	Maternal Mortality Ratio	Adolescent Birth Rate	Parliamentary Representation	Attainment at Secondary and Higher education	Labour Market Participation rate
Female	17	18	12.1	94.5	46.4
Male	NA	NA	19.1	97.9	62.5

8. Explain the 'Big Push' theory of economic development.

9. What are the causes for low capital formation in UDCs?

10. Explain Kaldor model of Distribution.

11. Explain Lewis theory of 'Unlimited Supply of Labour'.

12. Explain the rationale and pattern of industrialization in developing countries.

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

13. What is economic development? Distinguish between economic growth and economic development.

14. Explain the Rostow's stages of Economic Growth.

15. Explain the Fei-Ranis theory of economic development. What are its criticisms?

16. Explain Nurks Theory of Disguised Unemployment as a Saving-Potential. What are the criticisms?

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G 513.5b

Reg. No. :

St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER V – Degree Examination
October - 2019
ECONOMICS – Paper - VI
MATHEMATICAL ECONOMICS

Time: 3 hrs.

Max Marks: 100

Note: Graph sheets and log tables will be provided.

PART - A

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

1. A small firm incurs fixed expenses amounting to Rs. 12,000. Its variable cost of production is Rs. 5 per unit. Its selling price is Rs. 8 per unit. Determine its break-even quantity.

2. A person deposits an amount of Rs. 5000 at an annual rate of interest of 7%. How much money he will receive after 10 years if

   i) Interest is compounded annually.

   ii) If interest is compounded biannually.

3. If TC of a firm is : $TC = 0.0001x^2 + 0.04x + 500$, find the AC, MC, AVC, MAC and MVC.

4. The MR function of a firm is given by $MR = 240 - 2x$. Find the TR function and the demand function. At what level of output is TR maximum? Find maximum TR.

5. Mr. X went for shopping to buy 5 Kgs of apples, 3 Kgs of rice and 2 Kgs of vegetables. Their prices are Rs. 80, Rs. 100 and Rs. 200 per Kg respectively. Find the amount of total expenditure using matrix multiplication.

6. Write a note on Linear Programming.

PART – B

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

7. When the price of a certain commodity is found to be Rs. 20, the demand was 80 units. When the price is Rs. 30, the demand declined to 70 units. Find out the demand function and calculate the price elasticity of demand at these prices.

8. Pareto's law of income distribution for a particular group is given by –

   $$N = \frac{216 \, X \, 10^{10}}{X^{3}/_{2}}$$

   i) How many people are millionaires?

   ii) How many people have income between Rs. 3,600 and Rs. 10,000?

   iii) What is the lowest income of the 80 people with the highest income?

9. A monopolist has the demand function $22 - 0.5Q - P = 0$. The AC function is $AC = {}^1/_3 Q^2 - 8.5Q - 50 + \frac{90}{Q}$. Determine and calculate the maximum profit obtainable by the monopolist.

10. Find the profit maximizing output and the total profit at that quantity if the MR and MC function are given:

$MR = 25 - 5x - 2x^2$ and $MC = 15 - 2x - x^2$.

11. Solve the following equations using Cramer's Rule.

$2x_1 + 6x_2 = 22$

$-x_1 + 5x_2 = 53$

12. Minimise $A = 12x_1 - 5x_2$

Subject to, $X_1 - 2x_2 \geq 3$

$X_1 - x_2 \geq 4$

$X_1 x_2 \geq 0$

PART – C

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

13. The Demand and Supply function of a certain commodity are

$S = -5 + 0.5P$ and demand function $D = 55 - 2.5P$.

i) Find the equilibrium price and quantity.
ii) Find the changes in the equilibrium values when a tax of Rs.4 per unit is imposed and a subsidy of Rs.6 is given to the producer. Calculate the amount of revenue that the government can raise and the amount of subsidy that has to be given.

14. The demand and supply conditions for 3 related commodities are:

$D_A = 150 - 2P_a + P_b + P_c$ $S_A = 12P_a - 43$

$D_B = 280 + 3P_a - 5P_b + 4P_c$ $S_B = 7P_b - 144$

$D_C = 140 - P_a + 2P_b - 7P_c$ $S_C = 15P_c - 18$

i) Comment on the nature of relationship among the three commodities in terms of substitutes and complements.
ii) Find out the equilibrium values.

15. A discriminatory monopolist has the following demand functions in the two sub markets:

$P_1 = 12 - Q_1$ and $P_2 = 20 - 3Q_2$. The $TC = 3 + 2(Q_1 + Q_2)$.

Determine the prices, MRs and quantities sold in two sub markets and the total profit of the monopolist under price discrimination.

16. The demand function is $P = 20 - 3x^2$ and the supply function is $P = 2x^2$. Find the consumer's surplus and producer's surplus under pure competition.

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