

(2014 Batch Onwards)

G 501.5a

Reg. No.

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester V- Degree Examination

January - 202)

PHYSICS – Paper V

ATOMIC PHYSICS

Time: 3 hrs.

Max Marks: 100

SECTION – A

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

- a) Why S state is always singlet? Explain.
- b) State and explain Pauli's exclusion principle.
- c) Can $2p_{5/2}$ state exist? Give reason.
- d) Which atom model has introduced the orbital quantum number l ? For $l = 2$ write the possible values of m_l .
- e) What are eigen values and eigen functions?
- f) What are matter waves? What happens to de Broglie wavelength of the electron when its velocity increases?
- g) State Heisenberg Uncertainty Principle.
- h) What is meant by degeneracy?
- 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 depolarization factor? Give its significance.
- l) Distinguish between stokes and anti-stokes lines.

SECTION – B

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

UNIT – I

2. a) Describe the Stern-Gerlach experiment and explain the importance of the results obtained. (6)
- b) Explain the fine structure of sodium D lines. (4)
3. a) What are coupling schemes? Explain L-S coupling and J-J coupling in multi-electron systems. (6)
- b) Derive the expression for magnetic dipole moment of electron due to orbital motion. (4)

4. a) Explain the salient features of vector atom model. Mention the various quantum numbers used in vector atom model. (6)
- b) Describe the experimental arrangement for observing normal Zeeman effect. Mention the observations made. (4)

UNIT – II

5. a) Describe briefly Davisson-Germer experiment and analyze the results obtained in support of de Broglie hypothesis of matter waves. (6)
- b) Explain the physical significance of a wave function. What are the characteristics of a wave function? (4)
6. a) Assuming the time dependent Schrodinger wave equation, set up the time independent Schrodinger wave equation. (6)
- b) Explain the term, group velocity and phase velocity of de-Broglie waves. Write the relation connecting – i) group velocity and phase velocity
ii) group velocity and particle velocity (4)
7. a) Using Schrodinger wave equation for a particle in a linear potential box of infinite height, obtain energy eigen values and eigen wave functions. (6)
- b) Based on the uncertainty principle, account for the finite width of spectral lines. (4)

UNIT – III

8. a) Describe the Millikan's oil drop method to determine the charge on an electron. (6)
- b) Obtain the expression for rotational energy of a diatomic molecule. (4)
9. a) Derive the expression for the change in wavelength in Compton Scattering. (6)
- b) Give the quantum theory of Raman effect. (4)
- 10.a) With a neat diagram, describe the experimental arrangement to study the Raman effect. Mention the characteristics of Raman lines. (6)
- b) Explain the blue colour of the sky in the day and red colour of the rising and setting sun. (4)

SECTION - C

Answer any **FOUR** of the following:

(4×5=20)

11. 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 = $1.76 \times 10^{11} \text{ C/Kg}$.
12. The experimental value of Bohr magneton is 9.21×10^{-24} SI units. If Planck's constant $h = 6.63 \times 10^{-34} \text{ Js}$, calculate the value of e/m of electron.
13. A proton is confined to a nucleus of radius $5 \times 10^{-15} \text{ m}$. Calculate the uncertainty in i) linear momentum and ii) kinetic energy. Given mass of proton = $1.67 \times 10^{-27} \text{ kg}$.
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 $h = 6.63 \times 10^{-34} \text{ Js}$.
15. The distance between successive lines in the pure rotational spectrum of HF has a mean value of $121.5 \times 10^{10} \text{ sec}^{-1}$. Calculate the moment of inertia. Hence calculate the H-F bond length.
Given: Planck's constant $h = 6.63 \times 10^{-34} \text{ Js}$
Mass of hydrogen = $1.67 \times 10^{-27} \text{ kg}$
and Mass of Fluorine = $31.7 \times 10^{-27} \text{ kg}$
16. With an exciting radiation of wavelength 435.8nm, a substance showed a Raman line at a wavelength of 462.4nm. Find the wavelength and frequency of the corresponding anti-stokes line.

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester V – Degree Examination
January - 2021

PHYSICS - PAPER VI
Solid State Physics

Time: 3 Hours

Max. Marks: 100

SECTION – A

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

(10×2=20)

- Explain Maxwell-Boltzmann distribution law.
- Define molar specific heat of a solid. What is its unit?
- Define mobility of a charge carrier. What is its unit?
- Give two reasons for the electrical resistance of solids.
- Mention any two significances of Hall coefficient.
- What are intrinsic and extrinsic semiconductors?
- Distinguish between metals and semiconductors.
- What is a ferromagnetic material? Give one example.
- What are dielectric materials? Give one example.
- Name the seven crystal systems.
- What is meant by annealing of glasses? Why is it needed?
- State Mosley's law.

SECTION – B

Answer any **TWO** full questions from each unit.

(2×30=60)

UNIT - I

- Discuss Einstein's theory of specific heat of a solid. (6)
 - Explain FD and BE statistics. (4)
- Discuss the variation of specific heat of a material at low temperature based on Einstein's theory. (6)
 - Give the limitations of Dulong-Petit law. (4)
- What are the causes of electrical resistance in solids? Explain Lorentz-Drude model of a solid. (6)
 - Show that at high temperatures, Debye's theory of specific heat of solids reduces to Dulong-Petit law. (4)

UNIT - II

- Define Fermi energy and obtain an expression for it at absolute temperature. (6)
Hence obtain the expression for the average energy of the electrons.
 - Discuss Sommerfeld's model of a solid. (4)
- Obtain an expression for the electrical conductivity of an intrinsic semiconductor and hence discuss the variation of resistance with temperature. (6)
 - Distinguish between metals, semiconductors and insulators based on the energy gap. (4)

Contd...2

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7. a) Explain the band formation in solids with an example. (6)
b) What is Hall Effect? Deduce the expression for Hall Coefficient. (4)

UNIT - III

8. a) Explain how Miller indices are obtained for a crystal plane. (6)
b) State and explain Bragg's Law. (4)
9. a) Give the domain theory of ferromagnetic materials and distinguish between dia and ferro-magnetic materials. (6)
b) How are characteristic X-rays produced? (4)
10. a) Explain B-H curve of a ferromagnetic material. (6)
b) Distinguish between polar and non-polar dielectrics. (4)

SECTION - C

Answer any FOUR of the following.

(4×5=20)

11. Assuming that each copper atom contributes one electron to the free electron, find the number of free electron per unit volume relaxation time. Given conductivity of copper = 6×10^5 mho/cm, atomic weight = 63.54, density = 8.96 gm/cc.
12. Calculate the electron mobility in copper using the following data:
Relaxation time $\tau = 2.5 \times 10^{-14}$ sec, $e = 1.6 \times 10^{-19}$ C and $m_e = 9.1 \times 10^{-31}$ kg.
13. Using the following data, calculate the Fermi energy of silver at zero kelvin.
Atomic weight of silver = 108, density = 1050 kg m^{-3} .
14. Resistance of an intrinsic semiconductor at 30°C is 260Ω and at 100°C is 20Ω . Calculate the energy gap.
15. In a Bragg's spectrometer, the glancing angle for second order spectrum is observed to be 24° . Calculate the wavelength of the X-rays, if the crystal lattice spacing is 2.85×10^{-10} m.
16. Find the polarization produced in a dielectric medium of relative permittivity 20 in the presence of an electric field of 1000 v/m.

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January - 2021

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

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

(2x10=20)

- State Raoult's Law.
- Define osmotic pressure.
- What is meant by upper critical solution temperature?
- What are nanocomposites?
- What is a redox couple? Give one example.
- Why Zinc displaces Copper from Copper sulphate solution while Copper does not displace Zinc from Zinc sulphate?
- Explain Frank-Condon principle.
- Explain hypochromic shift with an example.
 - Mention the role of Calcium in the biological system.
 - Pyrrole is less basic than pyridine. Give reason.
- What is the product obtained when pyridine is sulphonated? Give the equation.
- What are condensed heterocyclic compounds? Give an example.

PART – B

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

(3x10=30)

- Write a short note on abnormal colligative properties. Define van't Hoff factor.
- 0.946g of a solute is dissolved in 150g of water. The resulting solution is observed to have a freezing point of 0.0651°C. What is molecular mass of the solute? (K_f for water is 1.86).
- Discuss the principle of solvent extraction.
- Mention the properties of carbon nanostructures.
 - Explain purification of Bauxite by Baeyer's process.
 - Explain masking process with one example.
- What is Frost diagram? Draw the Frost diagram of Nitrogen.
- State Beer-Lambert's law. Give any two of its limitations.
- Explain Fischer-Indole synthesis.

Contd...2

- x) Explain Bohr Effect.
- xi) Give the equation for halogenation reaction of Quinoline.
- xii) Explain Paal-Knorr synthesis of Furan.

PART – C**Answer any TEN of the following questions****(5x10=50)**

- 3. Describe the determination of molecular weight by Walker-Lumsden method.
- 4. Explain vapour pressure-composition curves of liquid mixtures which show positive deviation from ideal behavior.
- 5. Explain steam distillation with a neat diagram.
- 6. Discuss the applications of nanotechnology.
- 7. Explain the types of electronic transitions.
- 8. Explain the effect of conjugation on absorption maximum using molecular orbital theory.
- 9. What is Latimer diagram? Using the following Latimer diagram, Calculate the redox potential for $\text{ClO}_4^-/\text{HClO}_2$ couple.
$$\text{ClO}_4^- \xrightarrow{+1.20\text{v}} \text{ClO}_3^- \xrightarrow{+1.18\text{v}} \text{HClO}_2$$
- 10. Discuss the estimation of hardness of water by complexometric titration.
- 11. Explain Chichibaben reaction.
- 12. Write the general mechanism for electrophilic substitution in Pyrrole. Write the equation for nitration of Pyrrole.
- 13. Explain the structure of myoglobin.
- 14. Explain Bischler-Napieralski synthesis of Isoquinoline.

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January - 2021

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)

- State Planck's Radiation Law.
- Distinguish between Classical mechanics with Quantum mechanics.
- Which of the following molecule show rotational spectra? HCl, H₂, N₂O, NO, O₂.
- Give the expression for rotational constant and explain the terms involved.
- Define gram magnetic susceptibility.
- State Curie-Weiss law.
- Draw the Orgel diagram of d⁹ system.
- What are phosphonitrilic halides? Give any one use of phosphonitrilic halides.
- What is a non-reducing sugar? Give one example.
- Define isoelectric point of amino acid.
- Explain electrophoresis method of separation of amino acids.
- Comment on the secondary structure of proteins.

PART – B

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

(3x10=30)

- Define Linear operator. Mention the types with an example for each.
- Derive De-Broglie equation.
- Calculate moment of Inertia of a diatomic molecule whose internuclear distance is 150pm and reduced mass is 1.5×10^{-27} kg
- What is the effect of isotopic substitution on rotational spectra?
- Derive the spectroscopic ground state of d⁹ system.
- Calculate the magnetic moment of Fe in [Fe(CN₆)]⁴⁻ complex ion by spin only formula.
- Give any one method of preparation of Boron nitride.
- Explain diamagnetic property of transition metal complexes.
- How is glucose converted to arabinose?

Contd...2

- x) Give a method for the determination of ring size of glucose.
- xi) Explain McLafferty Rearrangement.
- xii) Outline the preparation of amino acid by Gabriels phthalimide reaction.

PART – C

Answer any TEN of the following questions

(5x10=50)

3. Define Compton effect. With neat labeled diagram explain Compton effect.
4. State the postulates of Quantum Mechanics.
5. Prove that various lines in rotational spectra are equally spaced.
6. Derive the expression for rotational energy of a rigid rotor.
7. Explain the variation of magnetic susceptibility of antiferromagnetic and ferromagnetic substances with temperature.
8. What are Silicones? Give any one method of preparation of cross linked silicones.
9. Explain the selection rules of electronic spectra of transition metal complexes.
10. What is intensity of magnetization? Give any four applications of magnetic moment data.
11. Explain the mechanism of osazone formation.
12. What is mutarotation? Give its mechanism.
13. Explain the classification of proteins.
14. Outline the principle of end group analysis for a protein.

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester V – Degree Examination

January - 2021

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. Define integral domain and give an example.
2. Let $f: R \rightarrow R'$ be a homomorphism of R in R' . Then prove that f is a $(1, 1)$ map if and only if $\ker f = 0$.
3. Prove that J_p is a field for a prime number 'p'.
4. If P is a prime ideal in R , then prove that R/P is an integral domain.
5. Define Euclidean domain.
6. Prove that $f(x) = x^2 + x + 1$ is irreducible over the ring of integers modulo 2.
7. Solve $\frac{d^3y}{dx^3} - 4\frac{d^2y}{dx^2} + \frac{dy}{dx} + 6y = 0$.
8. Find a particular solution of $(D^2 + 1)y = \sin x$.
9. Solve $(D^3 - D)y = x$.
10. Solve $x^2y'' - 3xy' + 4y = 0$ taking $z = \log x$.
11. Find 'A' in the method of variation of parameters to solve $y'' + y = \operatorname{cosec} x$ if $y = A \cos x + B \sin x$.
12. Find a particular solution of $(D^2 + 4)y = \cos 2x$.
13. Find $L\{t^2 - 3t + 5\}$.
14. Find $L\left\{\frac{1 - e^{-t}}{t}\right\}$.
15. Evaluate $L^{-1}\left\{\frac{3}{s^2 + 4}\right\}$.

PART – B

UNIT - I

Answer any THREE questions.

(3×5=15)

1. Let R be a ring. Then prove that
(i) $a \cdot 0 = 0 = 0 \cdot a$, $a \in R$ (ii) $a(-b) = (-a)b = -(ab)$, $a, b \in R$.
2. Prove that a finite integral domain is a field.
3. Let Q be the field of rational numbers. Then show that the only isomorphism of Q onto Q is the identity mapping I_Q .
4. Let R be a commutative ring with unit element whose only ideals are (0) and R . Prove that R is a field.
5. Show that intersection of two ideals is an ideal.

Contd....2

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

1. Prove that P is a prime ideal of \mathbb{Z} if and only if either $P = 0$ or $P = p\mathbb{Z}$ for some prime p .
2. Prove that an ideal M in a ring R is a maximal ideal if and only if R/M is a field.
3. Prove that every prime element is irreducible.
4. Prove that for any two elements 'a' and 'b' in a Euclidean ring there exists g.c.d of a and b in R .
5. Prove that in a polynomial ring $\deg(f(x) \cdot g(x)) = \deg f(x) + \deg g(x)$.

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

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

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

1. Solve: $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - 3y = x^2$.
2. Solve: $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} = 4 \cos(\log(1+x))$.
3. Solve $(D^2 + 1)y = \csc x$ by the method of reduction of order.
4. Solve $(D^2 + 1)y = \cot x$ by the method of variation of parameters.
5. Solve $x^2 y'' + xy' - y = 2x^2$ by first finding a part of the complementary function.

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

1. Let $f(t)$ be a periodic function with period ω . Then prove that

$$L\{F(t)\} = \frac{1}{1 - e^{-s\omega}} \int_0^{\omega} e^{-st} f(t) dt.$$

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

3. Using Laplace transforms solve the differential equation

$$x''(t) + 4x'(t) + 4x(t) = 4e^{-2t}, \quad x(0) = -1 \text{ and } x'(0) = 4.$$

4. Express $F(t)$ in terms of α function and find $L\{F(t)\}$ if $F(t) = \begin{cases} 2, & 0 < t < 1 \\ t, & t > 1 \end{cases}$.

5. Using convolution theorem, find $L^{-1}\left\{\frac{1}{s^2(s-1)}\right\}$.

(2014 Batch onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January 2021

MATHEMATICS – Paper VI
DISCRETE MATHEMATICS

Time: 3 Hours

Max. Marks: 100

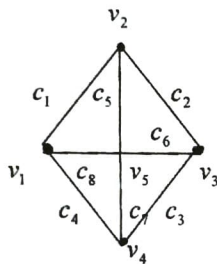
Note: Answer all parts

PART – A

Answer any TEN of the following.

(10×2½=25)

1. Prove that $2^n > n^3$ for $n \geq 10$ by mathematical induction.
2. Prove that the number of odd degree vertices in a graph is always even.
3. Define an Algorithm and its time complexity.
4. Give the definition of a lattice.
5. Define connected and disconnected graph and give examples for each.
6. Write any 3 cut-sets for the following graph.



7. Find the forward difference of the numeric function
$$a_r = \begin{cases} 0, & 0 \leq r \leq 2 \\ 2^{-r} + 5, & r \geq 3 \end{cases}$$
8. Define a prefix code. If $i=0, t=10, m=111, n=1100$ and $e=1101$. Decode the prefix code 1001111101.
9. Construct a phrase structure grammar for the language $L = \{a^i b^{2i} | i \geq 1\}$. Write the productions to obtain the string $aaabbbbb$.
10. Write the recurrence relation for the Fibonacci sequence of numbers.
11. Define $S^i a$ for any positive integer i and for a numeric function a .
12. Find the homogeneous solution of the difference equation $a_r - 2a_{r-1} + a_{r-2} = 0$
13. Prove that there is unique path between two vertices in a tree.
14. Define a tractable problem and give an example.
15. Analyse the time complexity of the algorithm 'LARGEST 2'.

Contd....2

G 503.5b(I)

PART - B
UNIT - I

(3×5=15)

Answer any THREE questions.

1. Let $T = \{a, b, c, d, +, *, (,), =\}$, $N = \{S, \text{exp}, \text{term}, \text{factor}, \text{id}\}$ with S as the starting symbol. Let the productions be,

$$S \rightarrow id = \text{exp}$$

$$\text{exp} \rightarrow \text{exp} + \text{term}$$

$$\text{exp} \rightarrow \text{term}$$

$$\text{term} \rightarrow \text{term} * \text{factor}$$

$$\text{term} \rightarrow \text{factor}$$

$$\text{factor} \rightarrow (\text{exp})$$

$$\text{factor} \rightarrow \text{id}$$

$$\text{id} \rightarrow a$$

$$\text{id} \rightarrow b$$

$$\text{id} \rightarrow c$$

$$\text{id} \rightarrow d$$

Write down the productions to obtain the sentence $C = a + d * (d + b)$.

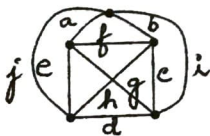
2. If no three diagonals of a convex decagon meet at the same point inside the decagon, into how many line segments are the diagonals divided by their intersections?
3. Show that any integer composed of 3^n identical digits is divisible by 3^n .
4. Explain phrase structure grammar with examples.
5. Prove that the set of real numbers between 0 and 1 is uncountably infinite.

UNIT - II

Answer any THREE questions.

(3×5=15)

1. For any connected planar graph, prove with usual notations that $v - e + r = 2$.
2. Define 'Eulerian path' and 'Hamiltonian path'. Trace an 'Eulerian circuit' and a 'Hamiltonian circuit' in the following graph



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 Hamiltonian path in G .
4. Show that the graph K_5 and $K_{3,3}$ are non-planar.
5. 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.

Contd....3

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

1. Prove that every circuit has an even number of edges in common with every cutset.
2. Describe an algorithm for determining a minimum spanning tree of a connected weighted graph.
3. Define a tree. If G is a tree with v vertices and e edges, then prove that $e = v - 1$.
4. Prove that a connected graph always contains a spanning tree.
5. Define a prefix code and construct a prefix code for the following alphabet, given the respective occurrences

Alphabet	a	b	c	d	e	f	g
Occurrences	10	5	8	3	6	5	2

UNIT - IV**Answer any TWO questions****(2×7½=15)**

1. State the algorithm 'BUBBLE SORT' used to sort the n numbers stored in n registers. Also analyse its time complexity.
2. State the algorithm 'LARGEST 2' to find the largest of n numbers. Also justify it with a formal proof and analyse the time complexity of the algorithm.
3. Show that the language $L = \{a^k \mid k = i^2, i \geq 1\}$ is not a finite state language.
4. When are the two states said to be k -equivalent? Illustrate with example.

UNIT - V**Answer any THREE questions****(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. Determine the numeric function a_r corresponding to the generating function
 - a) $A(Z) = \frac{2}{1-4z^2}$
 - b) $A(Z) = \frac{9}{1-3z}$.
4. Find a particular solution of the difference equation $a_r + a_{r-1} = 3r2^r$.
5. If $c = a * b$ where $a_r = 3^r, r \geq 0, b_r = 2^r, r \geq 0$ find c_r using generating functions.

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

January - 2021

MATHEMATICS PAPER VI

GRAPH THEORY

Time: 3 Hours.

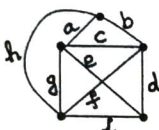
Max Marks: 100

PART -A

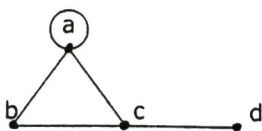
I Answer any TEN of the following.

(10X2½=25)

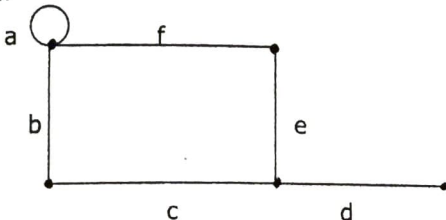
1. Define the following:
 - i) Regular Graph
 - ii) Complete Graph
2. Show that the number of vertices in a binary tree is always odd.
3. Write any three spanning trees of the following graph.



4. Define the terms:
 - i) Edge connectivity
 - ii) Vertex connectivity
5. Define the terms:
 - i) Branches of graph
 - ii) Chords of graph
6. Define planar and non-planar graphs with an example.
7. Write geometric dual graph in the following graph.



8. List all the fundamental cutsets with respect to the spanning tree $\{b, c, d, e\}$ in the graph.



9. Write down the graph G whose incidence matrix is given below.

$$A(G) = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 \end{bmatrix}$$

G 503.56(iii)

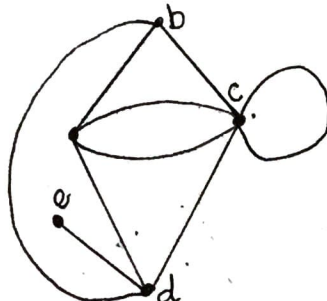
10. Write any three observations of circuit matrix of a graph G .
11. Write the chromatic polynomial of K_4 , where K_4 is a complete graph with 4 - vertices.
12. Define the terms:
 - i) Proper colouring
 - ii) Chromatic number.
13. Define the terms:
 - i) Complete digraph
 - ii) Strongly connected digraph.
14. Define arborescence of a digraph with an example.
15. Draw a labeled tree corresponding to the sequence $\{1 \ 3 \ 5 \ 5 \ 5 \ 9\}$.

PART - B**UNIT I****Answer any THREE of the following****(3x5=15)**

1. Define the term unicursal graph. Prove that in a connected graph G with $2K$ odd vertices, there exist K edge - disjoint subgraphs such that they together contain all edges of G and that each is a unicursal graph.
2. Prove that any connected graph with n - vertices and $(n-1)$ edges is a tree.
3. Prove that every tree contains atleast two end vertices.
4. Prove that the distance between vertices of a connected graph is a metric.
5. Prove that a connected graph G is an Euler graph if and only if it can be decomposed into circuits.

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

1. With respect to a spanning tree, prove that a branch b_i , that determines a fundamental cutset S is contained in every fundamental circuit associated with chords in S and in no others.
2. Prove that Kuratowski's second graph is non-planar.
3. Prove that a connected planar graph n vertices and e edges has $e-n+2$ regions.
4. Write the geometric dual of the following graph. Also give the observations between a planar graph G and its dual G^* .



5. Prove that a graph has dual iff it is planar.

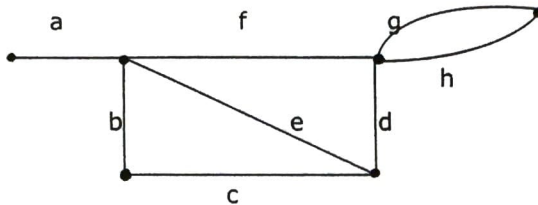
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UNIT III

Answer any THREE of the following

(3x5=15)

1. Prove that the rank of an incidence matrix of a connected graph with n vertices is $(n-1)$.
2. If B and A are circuit matrix and incidence matrix of a self loop free graph whose columns are arranged using the same order of edges then Prove that $A.B^T = 0(mod 2)$.
3. Write the cut-set matrix of the following graph.



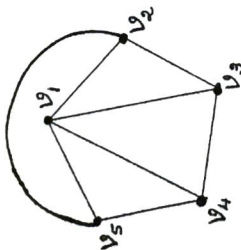
4. Prove that the rank of a circuit matrix of a connected graph with n vertices and e edges is $e - n + 1$.
5. Define path matrix of a graph with an example. Write three observations of a path matrix.

UNIT IV

Answer any THREE of the following

(3x5=15)

1. Prove that every tree 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 is $P_n(\lambda) = \lambda(\lambda-1)(\lambda-2)..(\lambda-n+1)$.
3. Prove that an n vertices graph is a tree if and only if its chromatic polynomial $P_n(\lambda) = \lambda(\lambda-1)^{n-1}$.
4. Find the chromatic polynomial of the following graph



5. Prove that a graph with atleast one edge is 2-chromatic if and only if it has no circuit of odd length.

UNIT V

Answer any THREE of the following

(3x5=15)

1. Prove that an arborescence is a tree in which every vertex other than the root has an in-degree of exactly one.
2. Prove that the determinant of every square submatrix of A , the incidence matrix of a digraph is 1, -1 or 0.
3. Prove that a digraph G is an Euler digraph if and only if G is connected and is balanced.
4. Prove that the number of simple labeled graph is $2^{\frac{n(n-1)}{2}}$.
5. State the algorithm to construct a directed Euler line in a digraph and prove that the directed walk constructed so becomes a directed Euler line.

(2007 batch onwards)

Reg. No:

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G 503.5b(iv)

St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V - Degree Examination
January - 2021
MATHEMATICS - Paper VI
LINEAR PROGRAMMING

Time: 3 Hours

Note: Answer all parts

Max. Marks: 100

PART - A

(10×2½=25)

I Answer any TEN of the following.

1. Define i) a line segment in \mathbb{R}^n ii) Feasible solution.
2. Define canonical slack minimization L.P.P.
3. Pivot on $a_{21} = 2$ in the following maximization table :

x	y	-1
1	4	7
2	5	8
3	6	9

4. Define maximum basic feasible L.P.P.
5. Write the matrix reformulation of minimization L.P.P.
6. Define unconstrained variables in a L.P.P.
7. State the Von-Neumann minmax theorem.
8. Reduce the table of the matrix game below using domination.

$$\begin{bmatrix} -1 & 0 & 2 & -2 & 0 \\ 0 & -2 & -4 & 2 & 2 \\ 0 & -1 & 1 & 1 & -1 \\ 0 & 5 & 4 & 2 & 0 \end{bmatrix}$$

9. Define mixed strategy for row player in the matrix game.
10. Define the general balanced transportation problem.
11. Explain the process of converting an unbalanced transportation problem to a balanced transportation problem when demand is more than supply.
12. Define a balanced assignment problem.
13. Define the cut, cut-set and the capacity of a cut in a capacitated directed network.
14. Prove that any flow in a capacitated directed network satisfies $\sum_j \phi(v_j) = 0$.
15. Define an α - path in a capacitated directed network.

PART - B

UNIT - I

(2×7½=15)

Answer any TWO questions.

1. Solve the following LPP graphically:
Minimize : $g(x, y) = 5x + 2y$
subject to $x + 3y \geq 14$
 $2x + y \geq 8$
 $x, y \geq 0$.

Contd...2

G 503.5b(iv)

2. a) State pivot transformation for maximum and minimum tables.
b) 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	$= f$

3. State the complete simplex algorithm for maximum table.
4. Solve the L.P.P

$$\text{Maximize } f(x, y) = x$$

$$\text{Subject to } x + y \leq 1$$

$$x - y \geq 1$$

$$y - 2x \geq 1$$

$$x, y \geq 0.$$

UNIT - II

Answer any TWO questions.

(2×7½=15)

1. Solve the LPP below :

$$\text{Maximize } f(x, y) = x + 3y$$

$$\text{subject to } x + 2y \leq 10, \quad 3x + y \leq 15.$$

2. State the dual simplex algorithm for minimum table.

3. Solve the non-canonical LPP :

$$\text{Maximize } f(x, y, z) = x + 2y + z$$

$$\text{subject to } x + y + z = 6$$

$$x + y \leq 1$$

$$x, z \geq 0.$$

4. State and prove duality equation.

UNIT - III

Answer any TWO questions

(2×7½=15)

1. Solve the dual non-canonical LPP:

	x_1	x_2	x_3	-1	
y_1	1	-1	2	1	$= -0$
y_2	2	0	2	-1	$= -t_2$
y_3	0	1	-1	-1	$= -t_3$
-1	1	-1	3	0	$= f$
	$= 0$	$= 0$	$= s_1$	$= g$	

2. Solve the matrix game and find optimal strategies.

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

G 503.5b(iv)

3. Solve the dual canonical LPP below.

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

4. Solve the following matrix game and find the value of the game.

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

UNIT - IV

Answer any TWO questions

(2×7½=15)

1. State the Hungarian algorithm to solve a balanced assignment problem.
2. State the transportation algorithm to solve a balanced transportation problem.
3. Solve the transportation problem below:

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

4. Solve the balanced transportation problem.

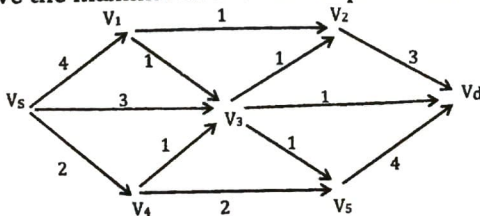
	M_1	M_2	M_3	M_4	
W_1	5	12	8	50	26
W_2	11	4	10	8	20
W_3	14	50	1	9	30
	15	20	26	15	

UNIT - V

Answer any TWO questions

(2×7½=15)

1. Solve the maximal flow network problem :



2. Define the shortest path network problem and state the shortest path algorithm - I.
3. State the Maximal flow algorithm.
4. Let $N = [V, E]$ be a capacitated direct network with unique fixed source and unique fixed sink, no edges into the source and no edges out of sink then show that a cut exists, whose capacity is equal to the value of maximal flow.

(2015 Batch onwards)

G 504.5a

Reg. No.

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester V – Degree Examination

January - 2021

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)**
- The difference between the sound and picture carrier frequency of a monochrome TV in CCIR-B system is _____
a) 4.5MHz b) 6MHz c) 7MHz d) 5.5MHz
 - The value of sound IF of a monochrome TV receiver in CCIR-B system is _____
a) 5.5MHz b) 33.4MHz c) 38.9MHz d) 4.43MHz
 - In the term NTSC, C stands for _____
a) color b) committee c) camera d) code
 - TV remote control uses _____ waves
a) light b) sound c) micro d) radio
 - _____ is the principle of propagation of light through optical fiber
a) reflection b) refraction c) total internal reflection
d) diffraction
 - A LASCR is an example for _____.
a) photo detector b) photo emitter c) modulator
d) amplifier.
 - Small section of fiber which is coupled to optical source is _____
a) coupler b) flylead c) splice d) connector
 - _____ converts electrical energy to optical energy.
a) optical detector b) optical isolator
c) optical source d) optical coupler
 - The domain used by educational institutions is -----.
a) .org b) .in c) .edu d) .com
 - URL stands for _____.
a) Universal resource locator b) uniform resource locator
c) uniform radio locator d) universal radio locator
 - _____ is used for browsing websites.
a) TCP b) FTP c) HTTP d) TFTP
 - The modulation technique used in GSM architecture is _____
a) FDMA b) FDMA + TDMA c) TDMA d) CDMA

2. Answer any TEN questions.

(10x1=10)

- Which deflecting system is used in TV?
- Mention one advantage of negative modulation?

Contd....2

- iii) Define the term 'Hue' w.r.to colour TV.
- iv) Draw the electrical symbol of Photo transistor.
- v) Mention the significance of numerical aperture of an optical fiber.
- vi) What is the advantage of solid state relay as compared to mechanical relay?
- vii) Define quantum efficiency w.r.t optical detector.
- viii) Mention any two differences between FDMA and TDMA.
- ix) What is the function of a MODEM?
- x) Expand the terms:
 - a) FTP and b) IMEI
- xi) What is meant by hard handoff?
- xii) Why do the cells have hexagonal shape in mobile communication?

3. Answer any TEN questions.

(10x2=20)

- i) Mention the advantages of Frequency reuse used in mobile communication.
- ii) Write a note on 'Search engine'.
- iii) Explain the construction of Target plate of Plumbicon camera tube.
- iv) What is a Optocoupler? Write its electrical symbol.
- v) Briefly explain the principle of a solar cell.
- vi) Calculate the acceptance angle of an optical fiber if the core and the cladding materials have the refractive indices of 1.5 and 1.485 respectively.
- vii) Mention any two advantages of Pulse modulation over Analog modulation.
- viii) Briefly explain CDMA technique.
- ix) What do you mean by "Luminance signal" and "Chrominance signal" in colour television?
- x) Write a note on MODEM.
- xi) Write a note on "Cell splitting".
- xii) Calculate the wavelength of light detected by a detector, which uses a semiconductor of energy gap of 2 eV.

SECTION - B

4. Answer any SEVEN questions.

(7x4=28)

- i) With necessary diagram, explain Step index and Graded index fibers?
- ii) Write a note on Progressive and Interlaced scanning in television communication.
- iii) Mention any four differences between NTSC and PAL systems
- iv) For a channel lying in the range (41-47)MHz, determine
 - i)The value of picture carrier frequency
 - ii)The value of sound carrier frequency
 - iii)The value of SIF and VIF
- iv) Draw the channel diagram
- v) With diagram explain a PIN diode detector
- vi) What is a Pseudo random noise code? How is it generated?

- vii) With block diagram explain THSS.
- viii) With necessary diagram explain Companding.
- ix) Write a note on WWW.
- x) Write a note on internet protocols.

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

- 5. a) With block diagram explain the process of outgoing call in GSM system. **(6)**
- b) Write a note on cell splitting and frequency reuse used in mobile communication. **(4)**

- 6. a) What is PWM? With circuit diagram explain the generation and detection of PWM signals. **(6)**
- b) Explain mobile identity IMSI in mobile communication. **(4)**

- 7. a) With necessary diagram, explain how carrier and optical confinement is achieved in a optical source. **(6)**
- b) Write a note on additive colour mixing. **(4)**

- 8. a) Draw the block diagram of monochrome TV transmitter and explain its video section. **(6)**
- b) Explain any two types of losses in fibers. **(4)**

(2015 Batch onwards)

G 504.5b

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V – Degree Examination

January – 2021

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) The instruction MOV A, 90h in 8051 controller is an example for _____ type of addressing mode.
a) direct b) indirect c) register d) implicit
- ii) _____ Interrupt of 8085 microprocessor has the highest priority.
a) RST 7.5 b) INTR c) TRAP d) RST 6.5
- iii) The instruction **DAD B** in 8085 μP adds the contents of _____ registers.
a) HL and DE b) HL and BC c) HL and SP d) DC and BE
- iv) _____ Register of 8051 controller does not have the internal address.
a) A b) DPH c) PC d) PSW
- v) 8085 μP has _____ bit address bus.
a) 20 b) 8 c) 32 d) 16
- vi) _____ instruction is invalid in 8051 μC .
a) MOV R₀, R₇ b) MOVX A,@DPTR c) MOV R₇, 30h d) DEC DPTR
- vii) DPTR of 8051 μC is _____ bit register.
a) 8 b) 16 c) 32 d) 4
- viii) DIV AB instruction in 8051 μC is used for _____ bit division.
a) 16 b) 8 c) 4 d) 20
- ix) 8051 μC has _____ math flags
a) 4 b) 3 c) 5 d) 6
- x) In 8051 μC the instruction **JZ, target** causes branching if _____.
a) A=00H b) C =0 c) OV=1 d) R₀=00H
- xi) The size of internal ROM of 8051 μC is _____.
a) 4 K bytes b) 128 bytes c) 256 bytes d) 512 bytes
- xii) In 8085 μP MVI A, 56 is example for _____ addressing mode.
a) immediate b) direct c) indirect d) register

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

- i) What is the addressing mode of the instruction LDA, F100h in 8085 μP .
- ii) How many timers are available in 8051 μC ?
- iii) What is the state of zero flag after the execution of the instruction XRA A in 8085 μP .
- iv) By default SP is pointing to which memory location in 8051 μC ?
- v) Which instruction of 8051 μC is used to exchange the nibbles of the Accumulator?
- vi) Which type of addressing mode is used to access stack in 8085 μP ?
- vii) Write any one instruction of 8085 μP to store an 8-bit data to the memory location directly from the accumulator
- viii) Which instruction of 8051 μC is used to set the particular bit in bit addressable memory?
- ix) Write the content of Accumulator after execution of following set of instructions in 8085 μP

MVI A, FAh
 SBI 35h
- x) What is the role of PC register in 8085 μP ?
- xi) Mention any one use of DPTR register of 8051 μC .
- xii) Which registers of 8051 is used for eight bit multiplication?

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

- i) Explain how register banks are selected in 8051 μC .
- ii) With example explain any one addressing mode of 8085 μP .
- iii) Mention any two instructions that will clear the content of accumulator in 8085 μP .
- iv) Explain the DJNZ instruction of 8051 μC .
- v) Mention any two differences between a microcontroller and microprocessor.
- vi) Explain any one bit-addressable instruction of 8051 μC .
- vii) Write a 8051 μC program to multiply 05h by 02h without using arithmetic instructions.
- viii) What is meant by scratch pad memory in 8051 μC ? How is it accessed?
- ix) With example explain how the data from the stack is accessed in 8051 μC .
- x) What is meant by non maskable interrupt? Give one example.
- xi) With example explain SBB instruction of 8051 μP .
- xii) Mention any two uses of counters in 8051 μC .

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

- i) Explain the array of registers of 8085 μP .
- ii) Write a 8085 μP program to find the smallest of two 8-bit numbers stored in locations X and X+1. Store the result in location X+3.

- iii) Write an 8085 μP program to add two numbers stored at consecutive external memory locations.
- iv) Draw the bit pattern of TMOD register of 8051 μC and explain the functions of various bits.
- v) Draw a labeled pin diagram of 8085 μP
- vi) With example explain any two addressing modes of 8051 μC .
- vii) Write a 8051 program to divide two 8-bit numbers.
- viii) With example explain any two, conditional jump instructions of 8051 controller.
- ix) With necessary diagrams explain any two rotate instructions of 8051 μC
- x) With example explain any two arithmetic instructions of 8085 μP .

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

- 5. a) Draw the architecture of 8085 μP and explain. **(7)**
 - b) With example explain any one addressing mode of 8085 μP . **(3)**

- 6. a) With necessary diagrams explain how internal RAM is organized in 8051 μC . **(5)**
 - b) With bit pattern explain the PSW of 8051 μC . **(5)**

- 7. a) Write an 8051 μC program to find the largest of two numbers stored in successive memory locations X and X+1. Store the result I location X+2. **(5)**
 - b) Write a note on stack of 8051 μC . **(5)**

- 8. a) What is a subroutine? Explain the mechanism of operation of a subroutine with an example. **(5)**
 - b) Write a note on interrupts of 8051 μC . **(5)**

(2015-2018 Batch)

G.505.5a

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January - 2021
COMPUTER SCIENCE - PAPER V
Relational Data Base Management System
Using Oracle

Time: 3 Hours.

Max Marks: 100

PART – A

1. Answer any **TEN** of the following. (10x2=20)
- Differentiate between logical and physical data independence.
 - What is the purpose of CHECK constraint?
 - Write any four types of interfaces.
 - Differentiate between procedure and function in PL/SQL.
 - Define primary key, super key.
 - Write any four DML statements in oracle.
 - What is a transaction?
 - List any two wild characters used in pattern matching.
 - What is degree of a relation?
 - Write an example for FOR...LOOP in PL/SQL.
 - What is a stored procedure?
 - Write the syntax of a trigger.

PART – B

Answer any **ONE FULL** question from each unit. (4x20=80)

UNIT - I

2. a) Write short notes on
- E-R model
 - Network data model
- b) Explain client-server architecture of DBMS. (7)
- c) Who is a database administrator? What are the responsibilities of a DBA? (6)
3. a) Write all the symbols used in E-R diagram with their meaning. (7)
- b) Explain two tier and three tier architecture using block diagrams. (7)
- c) Explain the classification of database management system. (6)

UNIT – II

4. a) List and explain different types of failures of Database. (6)
- b) Explain 3NF with an example. (4)
- c) Write notes on pattern matching and range searching. (5)
- d) Explain the Oracle statements to add and drop integrity constraints to table. (5)

5. a) Explain two examples each for constraint violations in insert, update and deletion operations. (6)
- b) Explain BCNF with example. (4)
- c) Explain the various types of Inner join operations. (5)
- d) Write a note on functional dependency. (5)

UNIT – III

6. a) Explain with syntax and example the following commands in Oracle. (7)
- i) Alter ii) Drop iii) Select
- b) Consider the following relation schema:
 STUDENT_ADMISSION(rollno, name, class, section)
 STUDENT_MARKS(rollno, sub1, sub2, sub3)
- Write SQL for the following:
- (a) Add columns total, average and result to STUDENT_MARKS.
- (b) Calculate the following and update the STUDENT_MARKS.
 TOTAL = sub1+sub2+sub3
 AVERAGE=TOTAL/3.0
- (c) Display the total marks of "Nisha". (7)
- c) Explain any two types of data constraints with examples. (6)
7. a) Explain any five aggregate functions with example. (7)
- b) Explain with syntax and example the following commands in Oracle. (7)
- i) UPDATE ii) COMMIT iii) ROLLBACK
- c) What is subquery? Explain with an example. (6)

UNIT – IV

8. a) Explain the structure of PL/SQL program with example. (7)
- b) Explain with syntax and example the interaction controls in Oracle. (7)
- c) Write the attributes of an explicit cursor with examples. (6)
9. a) Write a PL/SQL program to compute rent depending on category. The RENT table contains (ENO, ENAME, CATEGORY, RENT%). Rent is calculates as follows:
- | Category | 1 | 2 | 3 | 4 |
|----------|-----|-----|-----|-----|
| Rent % | 10% | 15% | 20% | 25% |
- (7)
- b) Write the advantages of functions. (7)
- c) Give one examples for each of the following:
- i) SQL%FOUND ii) SQL%NOTFOUND
- iii) SQL%ROWCOUNT iv) SQL%ISOPEN (6)

G 505.5b

(2015-2018 Batch)

Reg. No.:

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January -2021
COMPUTER SCIENCE- PAPER VI
Operating System and Linux

Time: 3 Hours.

Max Marks: 100

PART – A

1. Answer any **TEN** of the following. (10x2=20)
- a) Distinguish between job scheduling and CPU scheduling
 - b) Define Context Switching.
 - c) Write two methods of recovery from deadlock.
 - d) Differentiate between paging and segmentation.
 - e) Mention two situations where reader-writer locks may be required.
 - f) What is dispatcher and dispatch latency?
 - g) List any four process states.
 - h) Define the terms throughput and response time.
 - i) What is physical address space?
 - j) List the string operators and their meaning in Linux.
 - k) Write the usage of ls command in Linux?
 - l) What is the use of sort command?

PART – B

Answer any **ONE FULL** question from each unit. (4x20=80)

UNIT - I

2. a) List and explain the different services of operating system (8)
- b) Mention and explain different threading models. (6)
- c) Explain the following:
- i) Time sharing system
 - ii) Real time operating system (6)
3. a) Write a note on real time embedded system and hand held systems (8)
- b) List and explain the benefits of multithreading. (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 the critical section problem? Explain. (5)
- b) Explain the Round Robin algorithm. (5)
- c) Explain readers-writers problem (5)
- d) Explain SJF CPU Scheduling policies with example. (5)

Contd...2

- 5. a) Write a note on Bounded buffer problem. (5)
- b) Explain First come First Serve algorithm with example (5)
- c) Explain producer-consumer problem. (5)
- d) Write a note on semaphores. (5)

UNIT – III

- 6. a) What is LRU page replacement with three frames of the 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 the steps to find the number of page faults using LRU page replacement. (8)
- b) List and explain the necessary conditions for deadlock to occur. (6)
- c) Write a note on swapping. (6)
- 7. a) What is first-in-first-out (FIFO) page replacement? With three frames of the 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. (8)
- b) Explain Banker's Algorithm for dead lock avoidance (6)
- c) Explain optimal page replacement algorithm with example. (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 example
i) cat ii) chmod iii) mkdir (6)
- c) Write a shell script to generate Fibonacci numbers up to N. (6)
- 9. a) Explain case control structure available in Linux with syntax and also write a case structure to check the small case letters, capital letters, digits and special characters. (8)
- b) Write a note on vi editor. (6)
- c) Explain the 'while loop' and 'for loop' with syntax and example. (6)

(2016 Batch Onwards)

G 506.5a

Reg. No.:

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. - Semester V

January - 2021

STATISTICS - Paper V
Designs of Experiments

Max Marks: 100

Time: 3 Hours.

Note: Answer all parts

PART - A

(2x12=24)

I. Answer any TWELVE of the following:

1. What are the basic assumptions of analysis of variance?
2. State Cochran's theorem.
3. Define the term Treatments and Experimental units in design of experiments.
4. What do you mean by experimental errors in design of experiment?
5. What do you mean by the efficiency of design?
6. Mention any two applications of CRD.
7. What do you mean by the term randomisation in design of experiment?
8. Mention any two advantages of RBD.
9. Mention any two limitations of LSD.
10. Explain the adjustments made in the analysis of RBD with two missing observations.
11. What is a treatment contrast?
12. Mention any two disadvantages of factorial experiment.
13. What is factorial experiment?
14. Give the statistical model of 2^3 factorial experiment
15. Define the term Factors and Levels in factorial experiment.

PART - B

(6x6=36)

II. Answer any SIX of the following.

16. Derive the expression for expectation of sum of squares due to error in one-way classified data.
17. What do you mean by least significant difference? Explain the procedure of testing for the equality of any two treatment effects in CRD.
18. Derive an expression for estimating one missing value in LSD.
19. Explain the principles of designs of experiments.
20. Under two-way classified data show that $E(MST) = \sigma^2$.
21. Define RBD. Give its lay out. Also mention its disadvantages.
22. For a 2^2 experiment show that main effects and interaction effects are orthogonal contrast to each other.
23. For a 2^3 experiment derive the expression for main effects and interaction effects.

Contd...2

24. Describe the Yates Method of computing factorial totals in 2^2 factorial experiment.

PART – C

III. Answer any FOUR of the following.

(10x4=40)

25. Give the complete analysis of One-way classified data.
26. Explain the technique of analysis of variance in an LSD stating the break down of total sum of squares. Write down the degrees of freedom for different sum of squares. Write the ANOVA table.
27. Derive expressions for estimating two missing observations under RBD.
28. Derive an expression for Expected value of Sum of Squares due to error under Three-way classified data.
29. Give the complete analysis of 2^2 factorial experiment conducted in RBD.
30. Give the complete analysis of 2^3 factorial experiment conducted in RBD.

(2016 Batch Onwards)

G 506.5b

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. - Semester V

January - 2021

STATISTICS - Paper VI

Total Quality Management

Time: 3 Hours.

Max Marks: 100

Note: Answer all parts

PART - A

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

1. Define quality as an attribute.
2. If μ and σ are the process mean and S.D, then the control limits $\mu \pm 3\sigma$ are known as.....
3. Define control limits.
4. Define fraction defective.
5. Mention any two objectives of SQC.
6. Distinguish between defect and defective. Give an example for each.
7. What is statistical quality control?
8. Define process control.
9. Give the control limits of standardized p chart.
10. The average number of defects is found to be 4.84, find the control limits for number of defects chart.
11. Define sampling inspection.
12. Define producer's risk.
13. How is the choice between p and np chart made?
14. Define LTPD.
15. Define ASN.

PART - B

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

16. Distinguish between chance causes and assignable causes of variations.
17. Write the benefits of TQM.
18. Define process capability and explain its relationship with the specification limits.
19. Explain the concept of modified control limits of \bar{x} chart.
20. Explain the concept of rational subgroups.
21. Explain probability limits and warning limits.
22. Stating the theoretical basis, derive control limits for u-chart when the standard value is known.
23. Derive the expression for n and k of SSP by variables when lower specification is given and standard deviation is known.
24. Explain the concept of double sampling plan.

Contd...2

PART – C

III. Answer any FOUR of the following.

(10x4=40)

25. Explain the concept of TQM.
26. Stating the assumptions explain the construction of \bar{X} and R chart.
27. What are the criteria for lack of control with respect to control charts for variables?
28. Stating the assumptions, explain the construction of p chart.
29. Explain the concept of OC curve.
30. Stating the assumptions construct SSP for variables when upper specification limit is given and σ is unknown.

(2014 Batch Onwards)

G 507.5a

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St Aloysius College (Autonomous)

Mangaluru

B.Sc. Semester V- Degree Examination

January - 2022

BOTANY – PAPER V

ENVIRONMENTAL SCIENCE

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) Define an environment.
- 2) How the knowledge of environmental science helps the student to become a social worker and a tourism manager?
- 3) Write any two importances of biosphere reserves.
- 4) What is species diversity?
- 5) In which ecological group of plants vivipary is seen? Write its significance.
- 6) Define retrogressive succession.
- 7) Write the morphological adaptation of *Dischidia*.
- 8) What are Ephemerals? Give an example.
- 9) Write the widely adopted definition of sustainable development.
- 10) Write two reasons for more energy consumption of urban population.
- 11) Write the effect of global warming on sea level.
- 12) Give any four reasons for the displacement of people.

SECTION – B

II Answer any SIX of the following.

(6x5=30)

- 1) Give an account of energy flow in the ecosystem.
- 2) What is meant by man engineered ecosystem? Explain with an example.
- 3) Explain the pyramid of number and biomass with suitable examples.
- 4) Explain the morphological characteristics of any two parasitic plants.
- 5) Write notes on –
 - a) Crustose lichen stage
 - b) Foliose lichen stage
 - c) Moss stage
- 6) Explain the anatomical adaptations of *Nymphaea* and *Hydrilla*. Name their ecological group.
- 7) Define consumerism. Write a note on costs of consumerism.
- 8) Give an account of nuclear accidents and their effects on environment.
- 9) Write a note on environmental ethics.

Contd...2

SECTION - C

III Answer any FIVE of the following.

(5x10=50)

- 1) Describe the different processes in Succession.
- 2) Explain the morphological adaptations of any ten xerophytes you have studied.
- 3) Give an account of Hydrosere.
- 4) What is food chain? Explain types.
- 5) Give an account of biographical classification of India.
- 6) Explain the various threats to Biodiversity.
- 7) Give an account of energy problems in India and their solution.
- 8) What are the advantages of rainwater harvesting? Explain any one method of rain water harvesting.
- 9) Explain the approaches of wasteland management and reclamation.

(2014 Batch Onwards)

G 507.5b

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January - 2021
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) What are Pyrimidines? Give an example.
- 2) Define Charagaff's Rule of Base Equivalence.
- 3) Mention the significance of primers in DNA replication.
- 4) What is Wobbly base? Mention its significance.
- 5) What is a test cross? Mention its significance.
- 6) Differentiate between coupling and repulsion.
- 7) Differentiate between Phenotype and Genotype.
- 8) What is Monohybrid Cross? Mention its significance.
- 9) Differentiate between Paracentric and Pericentric inversions.
- 10) Define Trisomy? Give an example.
- 11) What is transition? Mention its significance.
- 12) What is Deletion? Mention the types.

SECTION – B

II Answer any SIX of the following.

(6x5=30)

- 1) Explain Meselson and Stahl's evidence for semi-conservative replication.
- 2) Write a note on chloroplast DNA.
- 3) Mention the significance of different enzymes in DNA replication.
- 4) Describe complementary gene interaction.
- 5) Explain Incomplete linkage with a plant example.
- 6) What are F₂ ratios obtained in i) Masking gene action ii) Incomplete dominance iii) Supplementary factors iv) Dihybrid cross v) Back cross
- 7) Write a note on Duplication and its types.
- 8) Give a detailed account on the types and effects of chemical mutagens.
- 9) Write a note on sex chromosome of Melandrium.

SECTION – C

III Answer any FIVE of the following.

(5x10=50)

- 1) List the characteristics of Genetic code.
- 2) Explain the following:
 - a. DNA as the transforming principle
 - b. Two differences between B-DNA and Z-DNA
- 3) Explain Transcription in Prokaryotes.
- 4) State the Law of Independent Assortment. Illustrate with a suitable example.
- 5) What is Crossing over? Mention its types. Add a note on its significance.
- 6) Describe Double Dominant Epistasis with plant example
- 7) What are Anuepoids? Elaborate the Trisomic and Nullisomic condition with plant example.
- 8) Write a note on i) Point Mutation ii) Lethal Mutations
- 9) What is Allopolyploidy? Describe the significance of allopolyploidy in plant breeding with two suitable examples.

(2014 Batch Onwards)

G 508.5a

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January - 2021
ZOOLOGY – PAPER V

HISTOLOGY, REPRODUCTIVE AND DEVELOPMENTAL BIOLOGY

Time: 3 Hours.

Max Marks: 100

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

ii) Draw diagrams wherever necessary.

PART – A

I Answer any TEN of the following.

(10X2=20)

- What is microtome? Mention the function of microtome.
- List any two advantageous of Haematoxylin-eosin Stains.
- What are Peyer's patches? Explain their function.
- Explain the function of Fallopian tube in reproduction.
- What is acrosome? How is it formed?
- Explain the term Hermaphroditism.
- Briefly explain the scope of embryology.
- What is chalaza? Explain its function.
- List any two functions of Amnion.
- Write any four functions of placenta.
- What is cryopreservation? Mention its significance.
- Explain the term Surrogate mother.

PART – B

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

Unit I

- Explain T.S of stomach of mammal with a labelled diagram. **(10)**
- Describe the process of Paraffin box preparation and section cutting. **(5)**
- Explain the structure of T. S. of kidney of a mammal. **(5)**

OR

- Explain the histology of the mammalian pancreas with the help of a neat labelled diagram. **(10)**
- Explain the principle of Ninhydrin -PAS reaction. **(5)**
- Draw a labelled diagram of the T.S of testis of mammal. **(5)**

Unit II

- Define oogenesis explain the phases with the help of schematic diagrams. **(10)**
- Define Metagenesis. Explain with reference to *Obelia*. **(5)**
- What are sexual cycles? Explain estrous cycle in rodents. **(5)**

OR

Contd...2

- V a) Define Parthenogenesis. Explain the different types with illustration and suitable examples. (10)
- b) Explain fertilizin and antifertilizin reaction in sea urchin. (5)
- c) Explain barrier methods of family planning. (5)

Unit III

- VI a) Give an account of the process of Ootogenesis and neurulation in frog. (10)
- b) Describe the structure of primitive streak of chick with an illustration. (5)
- c) Explain the theory of preformation. Give experimental evidence. (5)

OR

- VII a) Describe the origin, development, structure and function of amnion and allantois. Illustrate your answer with suitable diagram. (10)
- b) Draw a labelled diagram of V.S of blastula of frog. (5)
- c) Explain the process of cleavage in chick. (5)

Unit IV

- VIII a) Explain the mechanism of fertilization in humans with suitable diagrams. (10)
- b) Give an account of IVF – ET. (5)
- c) Write a short note on twins in human. (5)

OR

- IX a) Define organizer phenomenon. Explain the transplantation experiment of Spemann and Mangold on amphibian gastrula to show the dorsal lip of the blastopore as the organizing centre. (10)
- b) Explain the structure of human placenta and its function. (5)
- c) List the advantages and disadvantages of sperm bank. (5)

(2014 Batch Onwards)

G 508.5b

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January – 2021
ZOOLOGY – PAPER VI
ENVIRONMENTAL BIOLOGY, BIostatISTICS AND
WILDLIFE BIOLOGY

Time: 3 Hours.

Max Marks: 100

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

ii) Draw diagrams wherever necessary.

PART – A

I Answer any TEN of the following.

(10X2=20)

- What is Thermal stratification?
- What are biodegradable pollutants? Give two examples.
- Define food web. What are trophic levels?
- What is population? Give any two characteristics of population.
- What is continuous distribution of animals? Give an example.
- Define biotic factors. What is symbiosis?
- What is data?
- What are statistical packages?
- Name the subdivisions of Ethiopian realm.
- Name any four endemic fauna of Western Ghats.
- Give any four sources of air pollution.
- What are extinct species? Give one example.

PART – B

Select ONE full question from each unit.

Unit I

- II a)** Discuss the effects of light on plants and animals. **(10)**
- b) Explain parasitic food chain with an example. **(5)**
- c) Briefly explain pond ecosystem. **(5)**

OR

- III a)** State the laws of thermodynamics and explain energy flow in an ecosystem. **(10)**
- b) Explain cyclomorphosis. **(5)**
- c) Write a note on biosphere and ecotone. **(5)**

Unit II

- IV a)** Discuss with examples, the ecological classification of marine biota. **(10)**
- b) Explain the theories of climax community. **(5)**
- c) Write notes on Gause's principle. **(5)**

OR

- V a)** Define estuary. What are the types of estuaries? Discuss the biota of estuaries. **(10)**
- b) Write notes on ecological stratification. **(5)**
- c) With reference to population attributes, explain – i) Natality **(5)**
ii) Mortality

Contd...2

Unit III

VI a) What is environmental pollution? Explain water pollution with examples. (10)

b) The heart rates of four mammals are given below. Represent it with the help of bar diagram.

Mammals	Pig	Whale	Horse	cow
Heart beat/min	65	80	45	50

(5)

c) Write notes on 'Liebig's law of minimum'. (5)

OR

VII a) Find the median and mode of the following.

Percentage of marks	Number of students
0-20	07
20-40	18
40-60	12
60-80	13

(10)

b) Explain the following – i) Acid rain ii) Greenhouse effect (5)

c) Write notes on biomagnification. (5)

Unit IV

VIII a) Give an account of threats to wildlife and need for wildlife conservation. (10)

b) Write notes on wildlife in Andaman and Nicobar Islands. (5)

c) Give an account of the topography and fauna of oriental realm. (5)

OR

IX a) Define zoogeographical realm. Explain the Australian realm with reference to climatic condition and characteristic fauna. (10)

b) Give an account of human wildlife conflicts. (5)

c) Write notes on National Parks and Wildlife sanctuaries of India. (5)

G 509.5a

(2014 Batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January - 2021
MICROBIOLOGY – PAPER V
MEDICAL MICROBIOLOGY & IMMUNOLOGY

Time: 3 Hours.

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)

- Iatrogenic infection
- Herd immunity
- Adhesins
- Isoantigen
- Secretory antibody
- Epitope
- MALT
- NK Cells
- Lymph node
- Bacteriophage typing
- McFarland standard
- Attenuated vaccines

PART – B

Answer 'a' or 'b' and 'c' is compulsory from each unit.

(15x4=60)

UNIT -I

2. a) Discuss factors predisposing to microbial pathogenicity.

(9)

OR

b) What are the types of immunity? Explain each in brief.

c) Write a note on transmission of infection.

(6)

UNIT -II

3. a) Describe the properties of antigens.

(9)

OR

b) Explain the variable and constant domain of antibody.

c) Write a note on types of antigens.

(6)

UNIT -III

4. a) Explain the structure and function of Thymus. Add a note on T cells.

(9)

OR

b) Explain the process of humoral immune response.

c) Write a note on cytokines.

(6)

UNIT -IV

5. a) Describe the pathogenesis of shigellosis.

(9)

OR

b) Describe the laboratory diagnosis of enteric fever.

c) Write a note on dermatophytes.

(6)

PART – C

Answer any **FOUR** of the following.

(5x4=20)

- Exo and endotoxins.
- Epithelial barriers in innate immunity.
- Applications of monoclonal antibody.
- Interferons.
- Mechanism of cell wall inhibition by antibiotics.
- Rabies.

(2014 Batch Onwards)

G 509.5b

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St Aloysius College (Autonomous)
Mangaluru

B.Sc. Semester V – Degree Examination
January - 2021

MICROBIOLOGY – PAPER VI
PLANT MICROBIOLOGY AND BIOREMEDIATION

Time: 3 Hours.

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)

- Azolla
- SOM
- Nodule
- PCBS
- Biofertilizer
- Biostimulation
- T toxin
- Water activity
- Bioventing
- Green manure
- Biocontrol of soil born diseases
- Chemical weapons of pathogens

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. (9)

OR

b) Explain in detail about Blue green algal biofertilizer.

c) Write briefly on biocontrol of bacteria mediated frost injury (6)

UNIT -II

3. a) Explain in detail about Koleroga in arecanut. (9)

OR

b) Explain in detail about stages in development of diseases in plants.

c) Write a short note on Sandal Spike disease. (6)

UNIT -III

4. a) Explain about the biodegradation of pesticides. (9)

OR

b) Explain the environmental factors affecting biodegradation.

c) Write briefly on bioremediation. (6)

UNIT -IV

5. a) Explain in detail the microbiology of cellulose degradation. (9)

OR

b) Explain in detail the microbiology of lignin degradation.

c) Write briefly about the effects of humus on plant growth. (6)

PART – C

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

- Vermicomposting
- Host Specific Toxins
- Symbiotic Nitrogen Fixation by Rhizobia
- Inulin hydrolysis
- Persistence
- Alternaria alternata* toxin

(2014 Batch Onwards)

G 510.5a

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St Aloysius College (Autonomous)
Mangaluru
B. Sc. Semester V- Degree Examination
January - 2022
BIOCHEMISTRY – Paper V
MOLECULAR BIOLOGY

Time: 3 Hours

Max. Marks: 100

PART – A

1. Answer any **TEN** of the following. (10×2=20)
- What are Okazaki fragments?
 - Define wobble hypothesis.
 - What are introns and exons?
 - What is the significance of thymidine in DNA?
 - Write the functions of phosphodiesterase.
 - What happens when DNA is treated with an acid?
 - What is Cot curve?
 - What are non-sense codons? List them.
 - Write the effect of HNO₂ as a mutagen.
 - What are transposons?
 - Write the role of chloramphenicol as translational inhibitor.
 - What is frameshift mutation? Give example.

PART – B

- Answer any **SIX** of the following. (6×5=30)
- Explain the Griffith experiment.
 - Explain the Lac operon.
 - Explain the Watson and Crick model of DNA.
 - Write a note on Holliday model.
 - Explain the splicing mechanism.
 - Write a note on eukaryotic post translational modifications.
 - Explain the UV repair system in *E-Coli*.
 - Explain the secondary structure of t-RNA.

PART – C

- Answer any **FIVE** of the following: (5×10=50)
- Explain the mechanism of transcription in prokaryotes.
 - Explain different structures of chromosome with diagram.
 - Explain the mechanism of gene transfer by transformation and transduction in bacteria.
 - Explain the mechanism of DNA replication with neat diagram.
 - Explain the mechanism translation in eukaryotes.
 - Define mutation. Explain various types of mutations with example.
 - Write the general features of genetic code.

(2014 Batch Onwards)

G 510.5b

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St Aloysius College (Autonomous)
Mangaluru

B. Sc. Semester V- Degree Examination

January - 2021

BIOCHEMISTRY – Paper VI

BIOTECHNOLOGY, FOOD & INDUSTRIAL BIOCHEMISTRY

Time: 3 Hours

Max. Marks: 100

PART – A

1. **Answer any TEN of the following.** (10×2=20)
- What is vector? Give example.
 - What is restriction endonuclease?
 - What is BT Cotton?
 - Name any two bacteria which are used in gene transfer.
 - Write the applications of germplasm conservations.
 - What is micropropagation technique?
 - Mention the types of media used in plant tissue culture.
 - What is food intoxication?
 - Define primary metabolite.
 - Mention chemical names used in food preservation.
 - Define pasteurization.
 - What are aflatoxins?

PART – B

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

- Write about northern blotting technique.
- What is cDNA library? How to construct it?
- What are transformed cells? Explain.
- Explain principle of protoplast isolation and factors affecting it.
- Write a note on chemical method of determining the constituents of foods.
- Give an account on single cell protein.
- Write a note on food poisoning.
- Explain the steps involved on riboflavin production.

PART – C

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

- Explain *Agrobacterium* mediated gene transfer.
- Write the working principle and applications of PCR.
- Explain different method of food preservation.
- Write about media, growth regulators and role of nutrients in tissue culture.
- Explain industrial production of wine.
- How to screen microorganisms for over production?
- Give an account on transformed cell and its application.

G 511.5a

(2014 Batch Onwards)

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**St Aloysius College (Autonomous)
Mangaluru**

B.Sc. Semester V – Degree Examination

January - 2021

**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:

(10×2=20)

- Define xylogenesis.
- Write the contribution of G. Haberlandt.
- What is meant by embryo rescue?
- Differentiate between dedifferentiation and re differentiation.
- Define electrofusion.
- List out types of suspension culture.
- Define gynogenesis.
- What are hybrids?
- Define edible vaccines with two examples.
- Write the applications of somaclonal variations.
- Define *Agrobacteria* vectors with a suitable diagram.
- Name the markers used in gene transfer experiments.

PART - B

Answer any SIX of the following:

(6×5=30)

- Differentiate between somatic and zygotic embryos.
- Write a note on cytokinin.
- Explain the types of batch culture.
- Explain the isolation of protoplasts from suspension culture.
- Give an account on protoplast culture and regeneration.
- Explain chemofusion of protoplasts.
- Write a note on Golden rice.
- Give an account on somaclonal variation.
- Write a note on virus elimination through heat treatment.

PART - C

Answer any FIVE of the following:

(5×10=50)

- Explain synthetic seeds and its applications.
- Describe the composition of media used in tissue culture.
- Explain the technique of anther culture.
- Explain secondary metabolite production through bioreactor technology
- Describe the cryopreservation technique.
- Explain *Agrobacterium* mediated gene transfer in plants.

G 511.5b

(2014 Batch Onwards)

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. Semester V – Degree Examination
January - 2021
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)

- Define primary explant culture
- Give example for any two useful equipments used in animal cell culture lab
- Mention any two cryoprotectants employed for preservation of animal cells
- Name any two growth factors found in serum
- Mention two disadvantages of organ culture
- Give examples for any two methods employed for transfection of animal cells
- Define DNA microarray method
- Mention the scientific name of fish which has GFP
- Differentiate between totipotent and pluripotent stem cells
- Mention two disadvantages of cloning
- Elaborate SCNT. Give an example
- Differentiate between human, bovine and porcine insulin

PART-B

Answer any **SIX** of the following

(6×5=30)

- Elaborate on various types of banding techniques
- Explain the method of thymidine incorporation for measurement of cell proliferation
- Describe the stages of growth curve of animal cells with the help of a graph
- With a neat diagram elaborate on air lift fermentor
- Write short notes on designation of cell line
- Explain the hybridoma technology
- What is artificial skin? Explain the methods involved. Mention their applications.
- Write short notes on xenotransplantation
- Explain somatic gene therapy process

PART - C

Answer any **FIVE** of the following.

(5×10=50)

- Give a detailed account on trypsinization technique
- Elaborate on FACS and immunopanning methods
- Explain in detail on various antibiotic resistance markers
- Describe the techniques employed for characterization of cell lines
- Explain the various methods employed in production of transgenic fish. Add a note on their applications
- Explain the production of human growth hormone by rDNA technology

(2016 Batch Onwards)

G 513.5a

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER V – Degree Examination
January – 2021
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. Briefly explain the non-economic determinants of economic development.
2. Write a note on 'Indivisibilities'.
3. What are the arguments in favour of high COR?
4. Briefly explain Meade's neo-classical model of economic growth.
5. What are the problems of human capital formation?
6. Write a note on efficiency and productivity in agriculture.

PART - B

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

7. Distinguish between economic growth and economic development.
8. Explain the balanced growth theory of economic development.
9. Explain the role of capital formation in economic development.
10. Explain 'Pasinetti model of profit and growth'.
11. 'Population is a growth retarding factor'. Explain.
12. Explain the role of agriculture in economic development.

PART - C

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

13. Explain the various measurements of economic development
14. Explain the Rostow's stages of Economic Growth. What are its criticisms?
15. Explain the various sources of capital formation.
16. Examine Lewis' Theory of 'Unlimited Supply of Labour'. What are its criticisms?

(2016 Batch Onwards)

G 513.5b

Reg. No. :

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St Aloysius College (Autonomous)
Mangaluru
B.Sc. - SEMESTER V – Degree Examination
January – 2021
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.

(4×5=20)

1. If $X = -0.1 + 1.1Y$, find
 - i) The price when quantity supplied is 0.8.
 - ii) The quantity supplied if the price is Rs.6.
 - iii) The lowest price at which the commodity would be supplied.
 - iv) Graph the curve.
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. A firm has a demand function $D = 60 - 2P$. Find AR, TR and MR functions. Calculate the maximum revenue.
4. The MC function is : $C^1 = 4 + 6x + 30x^2$. Find the firm's TC, AC function given the fixed cost at Rs. 500. Calculate TC and AC when $X = 20$.
5. Find the inverse of $A = \begin{bmatrix} -1 & 6 \\ 4 & 3 \end{bmatrix}$
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. City Roadlines has the monthly seating capacity of 20,000 passengers on one of its router at a fare of Rs.170. Variable cost is Rs. 20 per passenger and fixed cost is Rs. 6,00,000. Find -
 - i) Break-Even Quantity
 - ii) Break-Even Sales
 - iii) How many passengers the company must get to earn a profit of Rs. 50,000.
8. Given $C = 102 + 0.07Y$, $I = 150 - 100i$, $M_s = 300$, $M_t = 0.25Y$ and $M_r = 124 - 200i$. Where, C = Consumption Function, I = Investment Function, i = rate of interest, M_r = Demand for money for speculative motive and M_t = Demand for money for transactionary and precautionary motive. Determine the equilibrium in the commodity and money market.

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9. For a firm under perfect competitive market $TC = 5 + 10Q - 0.09Q_2 + 0.04Q_3$.
If the price is Rs. 4 –
- Find the profit maximizing level of output.
 - What is the profit of the competitive firm?
10. Find the profit maximizing output and the total profit at that quantity if the MR and MC functions are given:
 $MR = 24 - 6x - x^2$ and $MC = 4 - 2x - x^2$.
11. There are two families 'A' and 'B'. There are 2 men, 2 women and 3 children in family A and 1 man, 1 woman and 2 children in family B. The recommended daily allowance for calories is men = 2400, women = 1900 and children = 1600 and protein is men = 60 grams, women = 50 grams and children = 35 grams. Using matrix multiplications calculate the total requirement of calories and proteins for each of the family.
12. Maximise $\pi = 40y_1 + 30y_2$
Subject to, $5y_1 + 2y_2 \leq 03$
 $2y_1 + 4y_2 \leq 28$
 $y_1, y_2 \geq 0$

PART – C

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

13. The Demand and Supply function of a certain commodity are
 $S = -10 + 8P$ and demand function $D = 20 - 4P$.
- Find the equilibrium price and quantity.
 - Find the changes in the equilibrium values when a tax of Rs.3 per unit is imposed and a subsidy of Rs.3 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:
 $D_1 = 23 - 5P_1 + P_2 + P_3$ $S_1 = -8 + 6P_1$
 $D_2 = 15 + P_1 - 3P_2 + 2P_3$ $S_2 = -11 + 3P_2$
 $D_3 = 19 + P_1 + 2P_2 - 4P_3$ $S_3 = -5 + 3P_3$
- Comment on the nature of relationship among the three commodities in terms of substitutes and complements.
 - Find out the equilibrium values.
15. A discriminatory monopolist has the following demand functions in the two sub markets:
 $P_1 = 17 - 2Q_1$ and $P_2 = 25 - 3Q_2$. The $TC = 2 + Q_1 + Q_2$.
- 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 $P = 25 - x^2$ and the supply function is $P = 2x + 1$. Find the consumer's surplus and producer's surplus under pure competition.
