# SRI.A.S.N.M.GOVERNMENT COLLEGE (A), PALAKOL, W.G.DT.

# DEPARTMENT OF MATHEMATICS

## BOARD OF STUDIES MEETING

# 2023-2024

**DATE: 14-09-2023**

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)
(Accredited with NAAC B+ Grade with 2.67 CGPA )

**2023-2024**

## DEPARTMENT OF MATHEMATICS

It is proposed to conduct Board of Studies of Mathematics meeting on 14 -09-2023 at 10 A.M. in the Department of Mathematics .Hence the following subject experts are requested to attend the same.

**Board of Studies Chairman** : **Sri K.SIVA KRISHNA**
In charge of Mathematics

**University Representative** : **Dr.D.Chittibabu**
Principal PHONE NO: 7659854317
Reader in Mathematics,
GDC, SEETHANAGARAM
East Godavari District
chittibabu.d9@gmail.com

**Subject Experts** : 1) **Dr.D.Madhusudhana Rao**
HOD of Mathematics, Phone No: 9440358718
Govt. College for Women (A),
GUNTUR, GUNTUR Dt.
dmrmaths@gmail.com

2) Sri **M.VENKATESWARA RAO**
Lecturer in Mathematics, Phone No: 9701851379
GOVERNMENT DEGREE COLLEGE,
AVANIGADDA, KRISHNA Dt.
mutyala.mvr@gmail.com

**Lecturers** : 1. **Smt.B.K.V. Rama Lakshmi**
2. **Sri K. SIVA KRISHNA**

**Industrialist / Businessmen** : **Sri K.Rajashekar Reddy**
Director, Manohari Plastic Industries
Penugonda, West Godavari Dt.

**Alumni** : **Sri G. SIVA KUMAR**
PHONE NO: 7287956454
Palakol, W.G.Dt.

**STUDENTS** : **P.BHANU SRI**
III B.Sc.(MPCs)
**O.Durga Bhavani**
II B.Sc. (MPCs)

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC B+ Grade with 2.67 CGPA )

**2023-2024**

## DEPARTMENT OF MATHEMATICS

It is proposed to conduct Board of Studies of Mathematics meeting on 14-09-2023 at 10 A.M. in the Department of Mathematics .Hence the following subject experts are requested to attend the same.

**Board of Studies Chairman** : **Sri K.SIVA KRISHNA**
In charge of Mathematics

**University Representative** : **Dr.D.Chittibabu**
Principal PHONE NO: 7659854317
Reader in Mathematics,
GDC, SEETHANAGARAM
East Godavari District
chittibabu.d9@gmail.com

**Subject Experts** : 1) **Dr.D.Madhusudhana Rao**
HOD of Mathematics, Phone No: 9440358718
Govt. College for Women (A),
GUNTUR, GUNTUR Dt.
dmrmaths@gmail.com

2) **Sri M.VENKATESWARA RAO**
Lecturer in Mathematics, Phone No: 9701851379
GOVERNMENT DEGREE COLLEGE,
AVANIGADDA, KRISHNA Dt.
mutyala.mvr@gmail.com

**Lecturers** : 1. **Smt.B.K.V. Rama Lakshmi**
2. **Sri K. SIVA KRISHNA**

**Industrialist / Businessmen** : **Sri K.Rajashekar Reddy**
Director, Manohari Plastic Industries
Penugonda, West Godavari Dt.

**Alumni** : **Sri G. SIVA KUMAR**
PHONE NO: 7287956454
Palakol, W.G.Dt.

**STUDENTS** : **P.BHANU SRI**
III B.Sc.(MPCs)
**O.Durga Bhavani**
II B.Sc. (MPCs)

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC $B^+$ Grade with 2.67 CGPA)

## DEPARTMENT OF MATHEMATICS

## 2023-2024

**Agenda**:

1. To approve the revised curriculum by APSCHE for First year (I Semester& II Semester) from the Academic year 2023-2024.
2. To approve Second and Third years exist BOS syllabus.
3. To prescribe the Syllabi suggested by University, with modification if any not exceeding 20% to suit the local needs, to be implemented from the Academic Year 2023-2024.
4. To select paper setters and examiners for theory and practical which ever applicable from the panel of Readers/ Lecturers working in some reputed colleges.
5. To approve 40 marks for Internal assessment and 60 marks for theory assessment of First year students from the academic year 2023-2024
6. To approve 40 marks for Internal assessment and 60 marks for theory assessment of Second Year Students
7. To approve 25 marks for internal assessment and 75 marks for theory assessment of Final year students.
8. To approve 35% Pass Mark of Semester end theory assessment examinations and Overall 40% Pass Mark of both Internal and external examination.
9. To approve Community service projects, Internships to the admitted batch.
10. To approve blue print and model question paper pattern for theory and Practical wherever applicable for semester examinations.
11. To approve introduce Certificate Course “GRAPH THEORY” For Mathematics students for this Academic year 2023-2024.
12. To approve Analytical skills syllabus and Model papers in First Semester &Third Semester.
13. Research, Teaching, Extension and other Academic activities in the department suggest, methodologies for innovate methods for Teaching and Learning.
14. To approve Course Codes for all semesters of Mathematics.
15. Any other with the Permission of the Chairman.

IC. Shastri
Chairman

Board Of Studies

Members Presented:

1.
2. Dr. D. MADHUSUDANA RAO
3. M. Venkateswarlu
4. B. Kur

P. Bhanu Sri

O. Durga Bhavani

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )

## DEPARTMENT OF MATHEMATICS

List of Examiners and Paper Setters

**2023-2024**

| S.No | Name of the Lecturer | Address |
|---|---|---|
| 1 | Dr.D.Chitti Babu | Principal & Reader in Mathematics, GDC,SEETHANAGARAM, East Godavari Dt. |
| 2 | Sri. G.Chandra Sekhar | Government College(A),Rajahmundry Phone No: 9666664242 |
| 3 | Sri.V.S.V.Krishna Murthy | Government Degree College, Razole, E.G.Dt. Phone No: |
| 4 | Sri G.Sridhar | SVKP &Dr.KSR Arts &Science college,Penugonda, West Godavari Dt |
| 5 | Dr.D.Ch. Papa Rao | GDC, KOTHA PET, East Godavari Dt. |
| 6 | Smt.V.Anantha Lakshmi | Principal, A.S.D. Women's college, Kakinada, E.G.Dt. Phone No: 9963786386 |
| 7 | Dr.Ch.Srinivasulu | Government College(A), Rajahmundry |
| 8 | B.Srinivasa Rao | GDC, Ravula Palem |
| 9 | Dr. K .Naveen kumar | Government College(A),Rajahmundry |
| 10 | Sri.R.K.Phanidhar | S.C.I.M. Government Degree College,Tanuku |
| 11 | Sri.G. Prakasam Babu | Government Degree College For Men, Nidadhavolu |
| 12 | Dr.D.Madhusudhana Rao | Govt. College for women(A), GUNTUR |
| 13 | M.Venkateswara Rao | GDC,AVANIGADDA, Krishna District |

## SRI A.S.N.M GOVERNMENT COLLEGE (A), PALAKOL, W.G.DT
## CBCS B.A/B.Sc. Mathematics Course Structure

## 2023-2024

| Year | Semester | Paper | Subject | Hours | Credits | IA | FA | Total |
|---|---|---|---|---|---|---|---|---|
| 1 | I | I | Essential and Applications of Mathematical, Physical and Chemical Sciences | 5 | 4 | 40 | 60 | 100 |
| | | II | Advances in Mathematical, Physical and Chemical Sciences | 5 | 4 | 40 | 60 | 100 |
| | II | III | Differential Equations& Problem solving Sessions | 5 | 4 | 40 | 60 | 100 |
| | | IV | Analytical Solid Geometry & Problem Solving Sessions | 5 | 4 | 40 | 60 | 100 |
| 2 | III | III | Abstract Algebra & Problem solving Sessions | 6 | 5 | 40 | 60 | 100 |
| | IV | IV | Real Analysis & Problem solving Sessions | 6 | 5 | 40 | 60 | 100 |
| | | V | Linear Algebra | 6 | 5 | 40 | 60 | 100 |
| 3 | V | VIA | Numerical Methods | 6 | 5 | 25 | 75 | 100 |
| | | VIIA | Mathematical Special Functions | 6 | 5 | 25 | 75 | 100 |
| | OR | | | | | | | |
| | | VIB | Multiple Integrals& Applications of Vector Calculus | 6 | 5 | 25 | 75 | 100 |
| | | VIIB | Integral Transformations with applications | 6 | 5 | 25 | 75 | 100 |
| | OR | | | | | | | |
| | | VIC | Partial Differential Equations &Fourier Series | 6 | 5 | 25 | 75 | 100 |
| | | VIIC | Number Theory | 6 | 5 | 25 | 75 | 100 |

SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC B⁺ Grade with 2.67 CGPA)

2023-2024

DEPARTMENT OF MATHEMATICS

Pattern of Mid-Term Examinations

I Mid Examination

| S.No | Type of Questions | No.of Questions given | No.of Questions Answered | Marks alloted | Total Marks |
|---|---|---|---|---|---|
| 1 | Bits or Multiple Choice Questions | 10 | 10 | 1/2 | 5 |
| 2 | Very Short Questions | 7 | 5 | 2 | 10 |
| 3 | Essay Questions | 3 | 1 | 5 | 5 |
| Total Marks | | | | | 20 |

II Mid Examination

| S.No | Type of Questions | No.of Questions given | No.of Questions Answered | Marks alloted | Total Marks |
|---|---|---|---|---|---|
| 1 | Short Questions | 2 | 1 | 10 | 10 |
| 2 | Essay Questions | 2 | 1 | 5 | 5 |
| Total Marks | | | | | 15 |

Assignments- 5 Marks

Seminars/GD/Field trips etc.- 5 Marks

Clean and Green - 5 Marks

Total – 50 Marks

Scale down to 40 For First and Second year

Scale down to 25 For Third year.

**SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT**
(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)
(Accredited with NAAC B+ Grade with 2.67 CGPA)

**DEPARTMENT OF MATHEMATICS**

Sri K.SIVA KRISHNA, In charge of BOS meeting for Mathematics which has been held on 14-09-2023 request the academic council to consider and approve the changes in the syllabus of all semesters and approve Certificate Course "GRAPH THEORY" is recommended by the Board of Studies for the academic year 2023-2024 and also recommended syllabi and core structure prescribed by ANUR for the all Semesters.

K.Sivakrishna
Chairman
Board of Studies

Members Presented:

1.
2. Dr. D. MADHUSUDANA RAO
3.
4. M. Venkateswarlu
   B. Kavya
5. P. Bhanu Sri
   O. Durga Bhavani
   G. Sivakumar

**SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT**
**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC $B^+$ Grade with 2.67 CGPA points)**

## DEPARTMENT OF MATHEMATICS

After through discussions the following Resolutions are made

1. It is resolved to approve the revised curriculum by APSCHE for First year ( 1st Semester& 2nd Semester) from the Academic year 2023-2024.
2. It is resolved to approve Second and Third year exist BOS syllabus.
3. It is resolved to prescribe the Syllabi suggested by University, with modification if any not exceeding 20% to suit the local needs, to be implemented from the Academic Year 2023-2024.
4. It is resolved to Select Paper Setters and Examiners for theory and practical which ever applicable from the panel of Readers/ Lecturers working in some reputed colleges.
5. It is resolved to approve 40 Marks for Internal assessment and 60 Marks for theory assessment of first year students from the academic year 2023-2024
6. It is resolved to approve 40 Marks for Internal assessment and 60 Marks for Theory assessment of Second year students.
7. It is resolved to approve 25 Marks for Internal assessment and 75 Marks for Theory assessment of Third year students.
8. It is resolved to approve 35% Pass Mark of Semester end theory assessment examinations and Overall 40% Pass Mark of both Internal and external examination.
9. It is resolved to approve Community service projects, Internships to the admitted batch.
10. It is resolved to approve blue print and Model question Paper Pattern for Theory and Practical wherever applicable for Semester Examinations.
11. It is resolved to approve introduce certificate course “GRAPH THEORY” for this Academic year 2023-2024.
12. It is resolved to approve Analytical skills syllabus and Model papers in First Semester and Third Semester.
13. Research, Teaching, Extension and other Academic activities in the department suggest, methodologies for innovate methods for Teaching and Learning.

14. It is resolved to approve Course Codes for all semesters of Mathematics.

15 It is resolved to approve any other modifications with the Permission of the Chairman.

IC. Sivakumar
Chairman

Board Of Studies

Members Presented:

1.

2. Dr. D. Madhusudana Rao

3.

4. M. Venkateswara Rao

B. Kiran

P. Bhanusri

O. Durga Bhavani

G. Sivakumar

## SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

## ADDITIONAL INPUTS

## DEPARTMENT OF MATHEMATICS

## 2023-2024

| SEMESTER | PAPER | Additional input |
|---|---|---|
| II | Differential Equations | **Partial Differential Equations:** Introduction, order of a PDE,Degree of a PDE, Linear and Non Linear PDE |
| II | Analytical Solid Geometry | **The Cylinder:** Definition of a Cylinder,Equation to the cylinder whose generators intersect a given conic and are parallel to the given line, Enveloping Cylinder of a Sphere |
| III | Abstract Algebra | **Number Theory:** Euclid's Lemma, The Fundamental theorem of Arithmetic, Congrunces, Euler-Ø Function, Fermat's Theorem, Wilson's theorem |
| IV | Real Analysis | **Elements of Set Theory:** Sets and their basic operations, Relations,Functions,Order,Denumerable sets, Decimal, Ternary and binary representations |
| IV | Linear Algebra | **Vector Space Isomorphism:**Fundamental theorem of homomorphism,Direct sums,singular and non-singular transformations, inverse function |
| V | Numerical Methods | **Curve Fitting:** Squares curve fitting procedures, fitting a straight line, nonlinear curve fitting, Curve fitting by a sum of exponentials. |
| V | Mathematical Special Functions | **Laguerre Polynomials:**Lagaurre's Differential equations, Solutions of Lagueree's equation,Generating function, Orthogonal Property of Laguerre Polynomials |

M. Venkateswarlu

B. [illegible]

K. Sivaiah

P. Bhanu Sri

O. Durga Bhavani

# SRI A.S.N.M. GOVT COLLEGE (A), PALAKOL
## SYLLABUS FOR CERTIFICATE COURSE

## 2023-2024

## TOPIC: GRAPH THEORY

30 HOURS

**UNIT-1: Graphs (15 Hours)**

**Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems Planner Graphs, Graph Coloring**

**UNIT-2: Trees (15 Hours)**

**Introduction to Trees, Applications of Trees, Tree Traversal, Spanning Trees, Minimum Spanning Trees**

**MODEL PAPER** **MAX MARKS- 50MARKS**

| | | | | |
|---|---|---|---|---|
| **UNIT-1** | - | **30 Multiple Choice Questions** | - | **30 X1 =30 M** |
| **UNIT-2** | - | **20 Multiple Choice Questions** | - | **20X1 = 20 M** |

DMR

M. Venkateswarlu

B. K. V. R

K. Sivaiah

P. Bhanu Sri

O. Durga Bhavani

## SRI A.S.N.M. GOVT. COLLEGE (A), PALAKOL

### PROGRAMME OUTCOMES

Upon the successful completion of Graduate & Post Graduate programme, students will be able to:

**PO 1.** Problem analysis: Identify, formulate, review research literature, and analyze complex problems reaching substantiated conclusions using first principles of mathematics, humanities and Sciences.

**PO 2.** Design/development of solutions: Design solutions for complex problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO 3.** Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO 4.** Modern tool usage: Create, select, and apply appropriate techniques, resources, IT tools including development, design, and prediction and modelling to real world activities with an understanding of the limitations.

**PO 5.** Environment and sustainability: Understand the impact of the professional problem solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO 6.** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO 7.** Efficient Communication & Life Skills:Apply ethical principles and commit to professional ethics and responsibilities and norms of the practice.

**PO 8.** Life-long learning: Learn "how to learn"- Self-motivated and self-directed learning. Adapt to the ever emerging demands of work place and life.

## BSC – MATHS, PHYSICS, CHEMISTRY (MPC)

## Program Specific Outcomes

**PSO1. Understand the theoretical concepts of physical and chemical properties of Materials and the role of Mathematics in dealing with them in a quantitative way.**

**PSO2.Introduction to various courses like Group theory, ring theory**

**PSO3. Analyse the concepts of Mathematics, Physics, Chemistry and understand the Relation among them like Mathematical modeling of Physics and chemistry problems.**

## BSC – MATHS, PHYSICS, COMPUTER SCIENCE (MPCS)

## Program Specific Outcomes

**PSO1. Understand the concepts of vector spaces, Group theory**

**PSO2.Analyse the concepts of Mathematics, Physics, and computer science able to relate them in Numerical programming of models of Mathematical systems.**

**PSO3.Students will get the Knowledge, understanding, skills ,attitude from the Mathematics subject.**

## BSC – MATHS, CHEMISTRY, COMPUTER SCIENCE (MCCs)

## Program Specific Outcomes

**PSO1. Analyse the concepts of Mathematics and computer science able to use them in Algorithm decision.**

**PSO2. Analyse the concepts of Mathematics, Chemistry and computer science and understand the relation among them like Mathematical modeling of Chemistry, Numerical problems in Computer science and deriving the equations in Chemistry.**

## BSC – MATHS, STATISTICS, DATA SCIENCE (MSDs)

## Program Specific Outcomes

**PSO1**. Acquire good knowledge and understanding to solve specific theorems and

Problems in areas of Mathematics and statistics.

PSO2.Make connections of Mathematical ideas to other ideas both inside and outside of Maths

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

**B.Sc. HONOURS MATHEMATICS (SINGLE MAJOR)**

**SEMESTER- I**

**COURSE-I : Essentials and Applications of Mathematical, Physical and Chemical Sciences**

**TIME: 3 HOURS** **BLUE PRINT** **Max Marks : 60 MARKS**

**UNIT-I- Essentials of Mathematics**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-II- Essentials of Physics**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-III- Essentials of Chemistry**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-IV-Applications of Mathematics, Physics and Chemistry**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-V- Essentials of Computer Science**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**DEPARTMENT OF MATHEMATICS**

**CO'S – PO'S**

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme&Semester I B.Sc.Mathematics(H) I Semester | | | |
|---|---|---|---|---|---|
| Course Code | Course-1: Essentials of Mathematics, Physics, Chemistry & Computer Science | | | | |
| Teaching | Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk) | L | T | P | C |
| Pre-requisites | Basic knowledge about Mathematics, physics, Chemistry and Computer science | 4 | 1 | - | 4 |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures. | K3 |
| CO2 | Employ the fundamental principles and concepts in various key domains of physics. | K3 |
| CO3 | Relate fundamental concepts encompassing various branches of chemistry in everyday life. | K3 |
| CO4 | Discover the intricate interrelationships and correlations among mathematics, physics, and chemistry in diverse practical scenarios. | K4 |
| CO5 | illustrate various threats, vulnerabilities, and counter measures in the realm of network security. | K4 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | | | | | |
| CO2 | 3 | 3 | 3 | | | | | |
| CO3 | 3 | 3 | 3 | | | | | |
| CO4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | | | | |

**SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL**

**WEST GODAVARI DISTRICT, ANDHRA PRADESH- 534260**

**SEMESTER-I, MATHEMATICS**

## COURSE 1: ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL ANDCHEMICAL SCIENCES

Theory Credits: 4 5 hrs/week

**Course Objective:**

The objective of this course is to provide students with a comprehensive understanding of the essential concepts and applications of mathematical, physical, and chemical sciences. The course aims to develop students' critical thinking, problem-solving, and analytical skills in these areas, enabling them to apply scientific principles to real-world situations.

**Learning outcomes:**

1. Apply critical thinking skills to solve complex problems involving complex numbers, trigonometric ratios, vectors, and statistical measures.

2. To Explain the basic principles and concepts underlying a broad range of fundamentalareas of physics and to Connect their knowledge of physics to everyday situations

3. To Explain the basic principles and concepts underlying a broad range of fundamentalareas of chemistry and to Connect their knowledge of chemistry to daily life.

4. Understand the interplay and connections between mathematics, physics, and chemistry invarious applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

5 . To explore the history and evolution of the Internet and to gain an understanding of network security concepts, including threats, vulnerabilities, and countermeasures.

**UNIT I: ESSENTIALS OF MATHEMATICS:**

**Complex Numbers:** Introduction of the new symbol i – General form of a complex number – Modulus-Amplitude form and conversions

**Trigonometric Ratios:** Trigonometric Ratios and their relations – Problems on calculation of angles**Vectors:** Definition of vector addition – Cartesian form – Scalar and vector product and problems **Statistical Measures**: Mean, Median, Mode of a data and problems

**UNIT II: ESSENTIALS OF PHYSICS:**

Definition and Scope of Physics- Measurements and Units - Motion of objects: Newtonian Mechanics and relativistic mechanics perspective - Laws of Thermodynamics and Significance- Acoustic waves and electromagnetic waves- Electric and Magnetic fields and their interactions- Behaviour of atomic and nuclear particles- Wave-particle duality, the uncertainty principle- Theories and understanding of universe.

**UNIT III: ESSENTIALS OF CHEMISTRY:**

Definition and Scope of Chemistry- Importance of Chemistry in daily life -Branches of chemistry and significance- Periodic Table- Electronic Configuration, chemical changes, classification of matter, Biomolecules- carbohydrates, proteins, fats and vitamins.

**UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY:**

**Applications of Mathematics in Physics & Chemistry:** Calculus , Differential Equations & Complex Analysis

**Application of Physics in Industry and Technology**: Electronics and Semiconductor Industry, Robotics and Automation, Automotive and Aerospace Industries, Quality Control and Instrumentation, Environmental Monitoring and Sustainable Technologies.

**Application of Chemistry in Industry and Technology:** Chemical Manufacturing, Pharmaceuticals and Drug Discovery, Materials Science, Food and Beverage Industry.

**UNIT V: ESSENTIALS OF COMPUTER SCIENCE:**

Milestones of computer evolution - Internet, history, Internet Service Providers, Types of Networks, IP, Domain Name Services, applications.

**Ethical and social implications:** Network and security concepts- Information Assurance Fundamentals, Cryptography-Symmetric and Asymmetric, Malware, Firewalls, Fraud Techniques- Privacy and Data Protection

**Recommended books:**


1. Functions of one complex variable by John.B.Conway, Springer- Verlag.
2. Elementary Trigonometry by H.S.Hall and S.R.Knight
3. Vector Algebra by A.R.Vasishtha, Krishna Prakashan Media(P)Ltd.
4. Basic Statistics by B.L.Agarwal, New age international Publishers
5. University Physics with Modern Physics by Hugh D. Young and Roger A. Freedman
6. Fundamentals of Physics by David Halliday, Robert Resnick, and Jearl Walker
7. Physics for Scientists and Engineers with Modern Physics" by Raymond A. Serway and John W. Jewett Jr.
8. Physics for Technology and Engineering" by John Bird
9. Chemistry in daily life by Kirpal Singh
10. Chemistry of bio molecules by S. P. Bhutan
11. Fundamentals of Computers by V. Raja Raman
12. Cyber Security Essentials by James Graham, Richard Howard, Ryan Olson


## STUDENT ACTIVITIES

### UNIT I: ESSENTIALS OF MATHEMATICS:

1: Complex Number Exploration

Provide students with a set of complex numbers in both rectangular and polar forms.

They will plot the complex numbers on the complex plane and identify their properties

2: Trigonometric Ratios Problem Solving

Give students a set of problems that require the calculation of trigonometric ratios and their relations.

Students will solve the problems using the appropriate trigonometric functions (sine, cosine, tangent, etc.) and trigonometric identities.

3: Vector Operations and Applications

Provide students with a set of vectors in Cartesian form.

Students will perform vector addition and subtraction operations to find the resultant vectors.

They will also calculate the scalar and vector products of given vectors.

4: Statistical Measures and Data Analysis

Give students a dataset containing numerical values.

Students will calculate the mean, median, and mode of the data, as well as other statistical measures if appropriate (e.g., range, standard deviation).

They will interpret the results and analyze the central tendencies and distribution of the data.

**UNIT II: ESSENTIALS OF PHYSICS:**

1. Concept Mapping

Divide students into groups and assign each group one of the topics.

Students will create a concept map illustrating the key concepts, relationships, and applications related to their assigned topic.

Encourage students to use visual elements, arrows, and labels to represent connections and interdependencies between concepts.

2. Laboratory Experiment

Select a laboratory experiment related to one of the topics, such as motion of objects or electric and magnetic fields.
Provide the necessary materials, instructions, and safety guidelines for conducting the experiment.
Students will work in small groups to carry out the experiment, collect data, and analyze the results.

After the experiment, students will write a lab report summarizing their findings, observations, and conclusions.

**UNIT III: ESSENTIALS OF CHEMISTRY**

1: Chemistry in Daily Life Presentation

Divide students into groups and assign each group a specific aspect of daily life where chemistry plays a significant role, such as food and nutrition, household products, medicine,or environmental issues.
Students will research and create a presentation (e.g., PowerPoint, poster, or video) that showcases the importance of chemistry in their assigned aspect.
2: Periodic Table Exploration

Provide students with a copy of the periodic table.

Students will explore the periodic table and its significance in organizing elements based on their properties.
They will identify and analyze trends in atomic structure, such as electronic configuration, atomic size, and ionization energy.

3: Chemical Changes and Classification of Matter

Provide students with various substances and chemical reactions, such as mixing acids and bases or observing a combustion reaction.
Students will observe and describe the chemical changes that occur, including changes in color, temperature, or the formation of new substances.
4: Biomolecules Investigation

Assign each student or group a specific biomolecule category, such as carbohydrates,proteins, fats, or vitamins.
Students will research and gather information about their assigned biomolecule category, including its structure, functions, sources, and importance in the human body.

They can create informative posters or presentations to present their findings to the class.

## UNIT IV: APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY

1: Interdisciplinary Case Studies

Divide students into small groups and provide them with interdisciplinary case studies that involve the interdisciplinary application of mathematics, physics, and chemistry.

Each case study should present a real-world problem or scenario that requires the integration of concepts from all three disciplines.

2: Design and Innovation Project

Challenge students to design and develop a practical solution or innovation that integrates mathematics, physics, and chemistry principles.

Students can choose a specific problem or area of interest, such as renewable energy, environmental conservation, or materials science.

3: Laboratory Experiments

Assign students laboratory experiments that demonstrate the practical applications of

mathematics, physics, and chemistry.

Examples include investigating the relationship between concentration and reaction rate, analyzing the behavior of electrical circuits, or measuring the properties of materials.

.4: Mathematical Modeling

Present students with real-world problems that require mathematical modeling and analysis.

## UNIT V: ESSENTIALS OF COMPUTER SCIENCE:

1. Identifying the attributes of network (Topology, service provider, IP address and bandwidthof
2. Your college network and prepare a report covering network architecture.
3. Identify the types of malwares and required firewalls to provide security.
4. Latest Fraud techniques used by hackers.

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

**COURSE -1. ESSENTIALS AND APPLICATIONS OF MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**

**SEMESTER-I, PAPER-1**

**B.Sc. HONOURS (MATHEMATICS)**

**TIME: 3 HOURS** **MAX MARKS: 60**

## SECTION-A

**Answer All Questions** **20x1=20M**

**1**. The value of $(\frac{1+i}{1-i})^n$=

a) 0 b) -1 c)1 d) --i

**2.** Find the value of $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$=

a) 1 b)-1 c)2 d) 0

**3**. if a=6i+2j+3k and b=2i-9j+6k then find n a.b

a) 18 b) 15 c) 12 d) 14

**4.** Calculate the Mean of the Numbers 165,170,168,172,169,175,168,173

a) 168.75b) 168.65 c)178.75 d) 167.75

**5**. Unit of plane angle is a

a) Radian b) Steradian c)Centimetre d) Metre

**6**. In Newton's second law the rate of change of momentum of a body is directly proportional to the applied

a) Density b) Temperature c) Force d) Mass

**7.** Charge of an electron is

a) Positiveb) Negative c)Neutral d) None

**8**. Velocity =

a) Distance/Time b) Pressure/Time c) Mass/Time

d) Displacemet/Time

**9)** What does analytical chemistry focus on?

a) Developing new materials
b) Identifying and quantifying components in a substance
c) Exploring the behavior of radioactive elements
d) Understanding biological molecules

**10.** What is the primary role of enzymes in living organisms?

a) Energy production
b) Structural support
c) Speeding up chemical reactions
d) Informational roles

**11**) Which vitamin is essential for vision, healthy skin, and mucous membranes?

a) Vitamin C
b) Vitamin A
c) Vitamin D
d) Vitamin E

**12**) What is the role of unsaturated fats in the body?

a) Provide insulation
b) Act as an energy source
c) Form structural components
d) Regulate body temperature

**13)** ARPANET stands for?

a) Advanced Research Project Agency Network

b) Advanced Research Programmed Auto Network

c) Advanced Research Project Automatic Network

d) Advanced Research Project Authorized Network

**14)** Which of the following is not a type of virus?

a) Boot sector b) Polymorphic c) Multipartite d) Trojans

**15) What is the full form of OSI?**

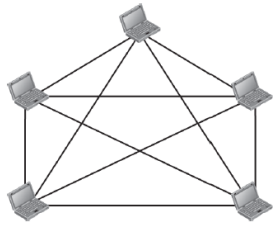
a) optical service implementation

b) open service Internet

c) open system interconnection

d) operating system interface

**16)** Which network topology does this represent?



a) Mesh b) Star c) Bus d) Ring

**17) _____ equations are used to describe thermodynamic process**

**a) differential b) Partial c) both a &b d) None of the above**

**18)** Transistors Made with

a)Insulators b) Conductors c) Semi conductors d) None of the above

**19)** What is the primary focus of the food and beverage industry in utilizing chemistry?

a) Drug discovery b) Materials science

c) Chemical manufacturing d) Enhancing food quality and safety

**20)** LED Stands for

a) Light Emitting Diode b) Light Energy Diode c) Light Electric Diode d) None of the above

## SECTION-B

**Answer All Fill in the Blank Questions 10x1=10M**

**1**. Formula for cos(A-B)=----------

**2.** Calculate Mode of the numbers 3,1,2,0,2,4,1,3,2,1 ----------

**3**. In electro statics force (F) = ----------

**4.** Range of visible light wave length From ----------To----------

**5.** Chemical reactions often involve the _____ of one or more substances into new substances.

**6.** _____ fats have one or more double bonds between carbon atoms.

**7.** Euler's Method is a basic technique used to approximate solutions of _____.

**8**. _____ is a method used in pharma Industry to develop new drugs by structures of Biological molecules.

**9.** A computer _____ is a malicious code which self-replicates by copying itself to other programs.

**10.** TCP/IP Stands for _____

## SECTION-C

**Answer All True or False Questions** **10x1=10M**

**1.** T $\mp = |T|^2$ (True or False)

**2.** Sin3A =3Sin3A-4Sin$^3$A (True or False)

**3**. Force = Mass×Acceleration(True or False)

**4.** A car moving in straightat a constant speed, then net force acting on the body is zero (True or False)

**5.** Chemistry is often referred to as the central science because it bridges the gap between physics and mathematics. (True or False)

**6.** The Aufbau Principle states that electrons fill higher energy orbitals first before lower energy orbitals. (True or False)

**7. Vitamins as biomolecules are essential for various metabolic processes**(True or False)

**8.** Mathematical Models are used to analyze Medical data ( TRUE/FALSE)

**9.** Firstly Internet was connected through 13 computers in 1969. (TRUE / FALSE)

**10.** RAM is volatile memory. (TRUE / FALSE)

## SECTION-D

**Answer All Very Short Answer Questions** **10x1=10M**

**1.** Let a=2i-j+k and b=3i+4J-K If θ is the Angle between a and b then find sin θ

**2.** Prove that Sin$^2$ $(52\frac{1}{2})$- Sin$^2$ $(22\frac{1}{2})$ $=\frac{\sqrt{3}+1}{4\sqrt{2}}$

**3**. State zeroth law of thermodynamics

**4.** What is Doppler effect ?

**5.** How does chemistry contribute to drug discovery?

**6.** How does chemistry contribute to environmental protection?

**7. What are the areas in which Chemical nanosensors can be employed?**

**8**. Write any two uses of Physics in Robotics?

**9**. What are the Types of Networks?

**10.** What is Cryptography?

## SECTION-E

**Answer The Matching Questions** **10x1=10M**

**1.** If z=3-5i **( )** (a ). $l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) xh$

**2**. Mode of Grouped data **( )** (b) then $z^3 - 10z^2 + 58Z - 136 = 0$

**3**. Many substances especially metals emit electrons when exposed to a suitable frequency of light (radiation) is called as **( )** (c) uncertainty principle

**4**. According to uncertainity principle the product of uncertainty in momentum and uncertainty in position is ≥ h/4π is called as **( )** (d) Photo electric effect

**5. Inorganic Chemistry ( )**study of elements that do not contain carbon-hydrogen bonds.

**6**. **Vitamin B6** **( ) (e)** **Pyridoxine**

**7**. Which type of mathematical Modeling is used to study the Behaviour of electrons ( ) (f) Integrated Circuits

**8.** ICs ( ) (g) Complex Analysis

**9**. Software intentionally designed to cause disruption to a computer ( ) (h) malware

**10.** Network security system that monitors and controls incoming and outgoing network Traffic ( ) (i) firewall

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL

**B.Sc. HONOURS MATHEMATICS (SINGLE MAJOR)**

**SEMESTER- I**

**COURSE-I : Essentials and Applications of Mathematical, Physical and Chemical Sciences**

**TIME: 3 HOURS** **BLUE PRINT** **Max Marks : 60 MARKS**

**UNIT-I- Advances in Basics Mathematics**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-II- Advances in Physics**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-III- Advances in Chemistry**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-IV-Advanced Applications of Mathematics, Physics and Chemistry**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

**UNIT-V-Advanced Applications of Computer Science**

| | | |
|---|---|---|
| **Multiple Choice Questions** | **-** | **4** |
| **Fill in the blanks** | **-** | **2** |
| **True (or) False Questions** | **-** | **2** |
| **Matching** | **-** | **2** |
| **Very Short Questions** | **-** | **2** |

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme&Semester I B.Sc.Mathematics(H) I Semester | | | |
|---|---|---|---|---|---|
| Course Code | Course-2: Advances in Mathematical, Physical &Chemical Sciences | | | | |
| Teaching | Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk) | L | T | P | C |
| Pre-requisites | Basic knowledge about Mathematics, physics, Chemistry and Computer science | 4 | 1 | - | 4 |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Use mathematical concepts to model and solve real world problems in the fields of physics and chemistry | K3 |
| CO2 | Demonstrate an advanced understanding of the concepts and recent developments in renewable energy generation | K3 |
| CO3 | Apply advanced techniques in design of drugs, nano sensors, catalysis and pollutant remediation. | K3 |
| CO4 | Develop models on principles of mathematics, physics and chemistry in diverse applications | K6 |
| CO5 | Implement knowledge of number systems,signals,error detection, and networking devices to communication technologies | K3 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | | | | 3 |
| CO2 | 3 | 3 | 3 | 3 | 3 | | | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | | | 3 |
| CO4 | 3 | 3 | 3 | 3 | 3 | | 3 | 3 |
| CO5 | 3 | 3 | 3 | 3 | | | | |

**SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL**

**SEMESTER-I, MATHEMATICS**

**COURSE 2: ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICALSCIENCES**

Theory Credits: 4 5 hrs/week

---

**Course Objective:**

The objective of this course is to provide students with an in-depth understanding of the recent advances and cutting-edge research in mathematical, physical, and chemical sciences. The course aims to broaden students' knowledge beyond the foundational concepts and expose them to the latest developments in these disciplines, fostering critical thinking, research skills, and the ability to contribute to scientific advancements.

**Learning outcomes:**

1. Explore the applications of mathematics in various fields of physics and chemistry, to understand how mathematical concepts are used to model and solve real-world problems.

2. To Explain the basic principles and concepts underlying a broad range of fundamental areasof physics and to Connect their knowledge of physics to everyday situations.

3. Understand the different sources of renewable energy and their generation processes and advances in Nanomaterials and their properties, with a focus on quantum dots. To study the emerging field of quantum communication and its potential applications. To gain an understanding of the principles of biophysics in studying biological systems. Explore the properties and applications of shape memory materials.

3. Understand the principles and techniques used in computer-aided drug design and drug delivery systems, to understand the fabrication techniques and working principles of nanosensors. Explore the effects of chemical pollutants on ecosystems and human health.

4. Understand the interplay and connections between mathematics, physics, and chemistry in various advanced applications. Recognize how mathematical models and physical and chemical principles can be used to explain and predict phenomena in different contexts.

5 Understand and convert between different number systems, such as binary, octal, decimal, and hexadecimal. Differentiate between analog and digital signals and understand their characteristics.Gain knowledge of different types of transmission media, such as wired (e.g., copper cables, fiber optics) and wireless (e.g., radio waves, microwave, satellite)..

## UNIT I: ADVANCES IN BASICS MATHEMATICS

**Straight Lines:** Different forms – Reduction of general equation into various forms – Point ofintersection of two straight lines

**Limits and Differentiation:** Standard limits – Derivative of a function –Problems on product ruleand quotient rule

**Integration:** Integration as a reverse process of differentiation – Basic methods of integration

**Matrices:** Types of matrices – Scalar multiple of a matrix – Multiplication of matrices – Transpose ofa matrix and determinants

**UNIT II: ADVANCES IN PHYSICS:**

**Renewable energy**: Generation, energy storage, and energy-efficient materials and devices. **Recent advances in the field of nanotechnology**: Quantum dots, Quantum Communication- recent advances in biophysics- recent advances in medical physics- Shape Memory Materials.

**UNIT III: ADVANCES IN CHEMISTRY:**

Computer aided drug design and delivery, nano sensors, Chemical Biology, impact of chemical pollutants on ecosystems and human health, Dye removal - Catalysis method

**UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS & CHEMISTRY**

**Mathematical Modelling applications in physics and chemistry**

**Application of Renewable energy**: Grid Integration and Smart Grids,

**Application of nanotechnology**: Nanomedicine,

**Application of biophysics**: Biophysical Imaging, Biomechanics, Neurophysics,

**Application of medical physics**: Radiation Therapy, Nuclear medicine

Solid waste Management, Environmental remediation- Green Technology, Water treatment.

**UNIT V: Advanced Applications of computer Science**

Number System-Binary, Octal, decimal, and Hexadecimal, Signals-Analog, Digital, Modem, Codec, Multiplexing, Transmission media, error detection and correction- Parity check and CRC, Networking devices- Repeater, hub, bridge, switch, router, gateway.

**Recommended books:**


1. Coordinate Geometry by S.L.Lony, Arihant Publications
2. Calculus by Thomas and Finny, Pearson Publications
3. Matrices by A.R.Vasishtha and A.K.Vasishtha, Krishna Prakashan Media(P)Ltd.
4. "Renewable Energy: Power for a Sustainable Future" by Godfrey Boyle
5. "Energy Storage: A Nontechnical Guide" by Richard Baxter
6. "Nanotechnology: Principles and Applications" by Sulabha K. Kulkarni and Raghvendra A. Bohara
7. "Biophysics: An Introduction" by Rodney Cotterill
8. "Medical Physics: Imaging" by James G. Webster
9. "Shape Memory Alloys: Properties and Applications" by Dimitris C. Lagoudas
10. Nano materials and applications by M.N.Borah

11. Environmental Chemistry by Anil.K.D.E.

12. Digital Logic Design by Morris Mano

13. Data Communication & Networking by Bahrouz Forouzan.

## STUDENT ACTIVITIES

### UNIT I: ADVANCES IN BASIC

### MATHEMATICS

1: Straight Lines Exploration

Provide students with a set of equations representing straight lines in different forms, such as slope-intercept form, point-slope form, or general form.

Students will explore the properties and characteristics of straight lines, including their slopes,intercepts, and point of intersection.
2: Limits and Differentiation Problem Solving

Students will apply the concept of limits to solve various problems using standard limits.

Encourage students to interpret the results and make connections to real-world applications, such as analyzing rates of change or optimizing functions.

3: Integration Exploration
Students will explore the concept of integration as a reverse process of differentiation and apply basicmethods of integration, such as the product rule, substitution method, or
Integration by parts.

Students can discuss the significance of integration in various fields, such as Physics and Chemistry4: Matrices Manipulation

Students will perform operations on matrices, including scalar multiplication, matrix multiplication, andmatrix transpose.

Students can apply their knowledge of matrices to real-world applications, such as solving systems ofequations or representing transformations in geometry.

### UNIT II: ADVANCES IN PHYSICS:

1: Case Studies

Provide students with real-world case studies related to renewable energy, nanotechnology, biophysics,medical physics, or shape memory materials.
Students will analyze the case studies, identify the challenges or problems presented, and propose innovative solutions based on the recent advances in the respective field.
They will consider factors such as energy generation, energy storage, efficiency, sustainability, materials design, biomedical applications, or technological advancements.2: Experimental Design

Assign students to design and conduct experiments related to one of the topics: renewable energy,nanotechnology, biophysics, medical physics, or shape memory materials.
They will identify a specific research question or problem to investigate and design an

Experiment accordingly.

Students will collect and analyze data, interpret the results, and draw conclusions based on their findings.

They will discuss the implications of their experimental results in the context of recent advances in the field.

3: Group Discussion and Debate

Organize a group discussion or debate session where students will discuss the ethical, social, and environmental implications of the recent advances in renewable energy, nanotechnology, biophysics, medical physics, and shape memory materials.

Assign students specific roles, such as proponent, opponent, or moderator, and provide them with key points and arguments to support their positions.

**UNIT III: ADVANCES IN CHEMISTRY:**

1. Experimental Design and Simulation

In small groups, students will design experiments or simulations related to the assigned topic.

For example, in the context of computer-aided drug design, students could design a virtual screening experiment to identify potential drug candidates for a specific disease target.

For nano sensors, students could design an experiment to demonstrate the sensitivity andselectivity of nano sensors in detecting specific analytes.
Chemical biology-related activities could involve designing experiments to study enzyme-substrate interactions or molecular interactions in biological systems.
Students will perform their experiments or simulations, collect data, analyze the results, and drawconclusions based on their findings.

2. Case Studies and Discussion

Provide students with real-world case studies related to the impact of chemical pollutants onecosystems and human health.
Students will analyze the case studies, identify the sources and effects of chemical pollutants, and propose mitigation strategies to minimize their impact.

Encourage discussions on the ethical and environmental considerations when dealing withchemical pollutants.
For the dye removal using the catalysis method, students can explore case studies wherecatalytic processes are used to degrade or remove dyes from wastewater.

Students will discuss the principles of catalysis, the advantages and limitations of thecatalysis method, and its applications in environmental remediation.
3: Group Project

Assign students to work in groups to develop a project related to one of the topics.

The project could involve designing a computer-aided drug delivery system, developing anano sensor for a specific application, or proposing strategies to mitigate the impact of chemical pollutants on

ecosystems.
Students will develop a detailed project plan, conduct experiments or simulations, analyzedata,and present their findings and recommendations.
Encourage creativity, critical thinking, and collaboration throughout the project.

**UNIT IV: ADVANCED APPLICATIONS OF MATHEMATICS, PHYSICS &CHEMISTRY**

1: Mathematical Modelling Experiment

Provide students with a mathematical modelling experiment related to one of the topics. For example, in the context of renewable energy, students can develop a mathematical model to optimize the placement and configuration of solar panels in a solar farm.
Students will work in teams to design and conduct the experiment, collect data, and analyze the results using mathematical models and statistical techniques.
They will discuss the accuracy and limitations of their model, propose improvements, and interpret the implications of their findings in the context of renewable energy or the specific application area.

2: Case Studies and Group Discussions

Assign students to analyze case studies related to the applications of mathematical modelling nanotechnology, biophysics, medical physics, solid waste management, environmental remediation,or water treatment.
Students will discuss the mathematical models and computational methods used in the case studies,analyze the outcomes, and evaluate the effectiveness of the modelling approach.
Encourage group discussions on the challenges, ethical considerations, and potential advancements in the field.

Students will present their findings and engage in critical discussions on the advantages and limitations of mathematical modelling in solving complex problems in these areas.

3. Group Project

Assign students to work in groups to develop a group project that integrates mathematical modelling with one of the application areas: renewable energy, nanotechnology, biophysics, medical physics, solidwaste management, environmental remediation, or water treatment.

The project could involve developing a mathematical model to optimize the delivery of radiation therapy in medical physics or designing a mathematical model to optimize wastemanagement practices.
Students will plan and execute their project, apply mathematical modelling techniques,analyzethe results, and present their findings and recommendations.
Encourage creativity, critical thinking, and collaboration throughout the project.

**UNIT V: Advanced Applications of computer Science**

Students must be able to convert numbers from other number system to binary number systems

1. Identify the networking media used for your college network Identify all the networking devices used in your college premises.

**SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL**

**COURSE -2 . ADVANCES IN MATHEMATICAL, PHYSICAL AND CHEMICAL SCIENCES**

**SEMESTER-I, PAPER-II**

**B.Sc. Major Honours (MATHEMATICS)**

**TIME: 3 HOURS** **MAX MARKS: 60**

## SECTION-A

**Answer All Questions** **20x1=20M**

**1)** Intersection point of the straight lines 3x+5y-6=0 and 5x-y-10=0 is

a)(3,0) b) (2,0) c) (5,-1) d) (6,3)

**2)** $\frac{d}{dx}(e^{3x})$ =

a) $e^{3x}$ b) $-e^{3x}$ c) $3e^{3x}$ d) 3x

**3)** $\int x^3$ dx =

b) $x^3$ b) $\frac{x^4}{4}$ c)$x^4$ d) $3x^4$

**4)** A Matrix having number of rows equals to number of columns is called

a) Rectangular Matrix b) Square Matrix c) Row Matrix d) Identity Matrix

**5**) What is the unit of energy

a) Meter b) Newton c) Joule d) Kelvin

**6)** One Nano meter =

a) 10^-10m b) 10^-6m c) 10^-3m d) 10^-9

**7)** Photovoltaic cells ( Solar cells) are devices which are made with

a) Semi conductors b) conductors c) insulators d) none

**8) In Radiation therapy most often uses**

**a) UV Rays b)Gama Rays c) X-Rays d) Sound Waves**

**9)** What is the primary focus of Structure-Based Drug Design (SBDD)?

a) Analysing ligand structures b) Identifying potential targets

c) Determining target protein structures d) Synthesizing lead compound

**10)** In the drug-discovery process, which phase involves evaluating the absorption, distribution, metabolism, excretion (ADME), and toxicity profiles of lead compounds?

a) Discovery phase b) Development phase c) Registry phase d) Experimental testing phase

**11)** In biotechnology, chemical biology is used for creating:

a) Engineered organisms b) Drug targets c) Biosensors d) Chemical probes

**12)** In Nan electronics, Nano sensors are primarily used for:

a) Enhancing food safety b) Monitoring pollutants

c) Improving electronic device performance d) Detecting explosives

**13)** PLM Stands for

a) Peak Load Management b) Plant Load Management

c) Power leakage Management d) Plant Leakage Management

**14) Neuro Physics is the branch of medical physics that studies nervous system in**

**a) Legs b) Brain c) Hands d) Stomach**

**15) Nuclear Medicine uses**

**a) Non Radioactive Materials b) Organic Materials**

**c) Radioactive Materials d) None of the above**

**16) What is the primary focus of food and beverage industry**

**a) Drug discovery b) Material Science**

**c) Chemical Manufacture d) Enhancing food quality and safety**

**17)** Convert $(214)_8$ into decimal.

a) $(140)_{10}$ b) $(141)_{10}$ c) $(142)_{10}$ d) $(130)_{10}$

**18)** Convert the binary number (01011.1011)2 into decimal.

a) $(11.6875)_{10}$ b) $(11.5874)_{10}$ c) $(10.9876)_{10}$ d) $(10.7893)_{10}$

**19)** How many layers are there in the ISO OSI reference model?

a) 7 b) 5 c) 4 d) 620

**20)** Which of the following devices forwards packets between networks by processing the routing information included in the packet?

**a) firewall b) bridge c) hub d) router**

## SECTION-B

**Answer All Fill in the Blank Questions** **10x 1=10M**

1. The slope of the equation of a line 2x-6y+3=0 is _____ .
2. If A= $A^T$, then the matrix A is called _____
3. In radiation Therapy most often uses _____
4. Give examples of renewable energy sources _____
5. _____ is a method used in the pharmaceutical industry to develop new drugs by analyzing the three-dimensional structures of biological molecules.
6. In synthetic biology, chemical biology is utilized to design and construct novel biological systems with specific _____.
7. OMS Means _____
8. In Chemical Manufacturing the application of chemical principles involve The design and optimization of large scale _____
9. The decimal equivalent of the binary number (1011.011)2 is _____
10. (170)10 is equivalent to _____ in hexadecimal form

## SECTION-C

**Answer All True or False Questions .** **10x1=10M**

1. Let A and B be invertible matrices then $(AB)^{-1} = B^{-1}A^{-1}$ ( TRUE OR FALSE)
2. $\lim_{x\to\infty}\left(\frac{sinx}{x}\right) = 3$ (TRUE OR FALSE)
3. Solar energy is the nonrenewable energy. (TRUE OR FALSE)
4. Energy efficient materials and devices reducing green house gas emissions.(TRUE OR FALSE)
5. In the drug-discovery process, the discovery phase focuses on evaluating compounds in in vitro and in vivo models.(TRUE OR FALSE)
6. Nanosensors operate on a larger scale than 100 nanometers for better sensitivity.(TRUE OR FALSE)
7. The Smart grid will help consumers manage their electricity bill (TRUE OR FALSE)
8. Chemistry has minimal impact on quality ,taste and safety of food products ( true or False)
9. A device that is used to connect a number of LANs is.called a router(TRUE OR FALSE)
10. Hexadecimal number system is a base 16 number system (TRUE OR FALSE)

## SECTION-D

**Answer All Very Short Answer Questions.** **10x1=10M**

1. Write the equation of a straight line in Slope –intercept form
2. Define Transpose of a Matrix.
3. Explain the basic structure of quantum Dot.
4. What are shape memory materials?
5. What is the main objective of Computer-Aided Drug Design (CADD) in the drug-discovery process?
6. Describe the application areas of Biological Nano Sensors and provide an example of their use in healthcare.
7. What is Smart Grid?
8. What is the primary focus of chemistry in chemical manufacturing beyond The production of chemicals?
9. Define a router?
10. List out functionalities of bride.?

## SECTION-E

**Answer The Matching Questions** **10x1=10M**

| | | | |
|---|---|---|---|
| **1.** $\int x dx$ | ( ) | **a)** 2x | |
| **2.** $\frac{d}{dx}(x^2)$ | ( ) | **b)** $\frac{x^2}{2}$ | |
| **3.** The by products of hydrogen fuel cell is heat and electricity and | ( ) | **c)** electricity | |
| **4.** Solar cells directly converts light into | ( ) | **d)** Water | |
| **5.** Protein-Ligand Docking | ( ) | **(e)** | Large-scale screening of small molecules |
| **6.** Chemical Genomics | ( ) | **(f)** | Predict how ligands interact |
| **7.** The general equation for Exponential Decay is | ( ) | (g) | Discorded Material |
| **8.** Solid Waste is the | ( ) | (h) | $N(t) = N_0 e^{-rt}$ |
| **9.** Router works at ---- layer of OSI model | ( ) | **(i)** | Data link layer |
| **10.** Bridge works at ---- Layer of OSI model | ( ) | **(j)** | Network layer |

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme Semester I B.Sc.Mathematics(H) II Semester | | | |
|---|---|---|---|---|---|
| Course Code | Paper-III- Differential Equations | | | | |
| Teaching | Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk) | L | T | P | C |
| Pre-requisites | Basic Knowledge about Formulae of Differentiation | 4 | 1 | - | 4 |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Solve First Order First Degree Linear Differential Equations | K3 |
| CO2 | Modify a Non- Exact Homogenous Equation TO Exact Differential Equation | K6 |
| CO3 | Apply different Methods of Finding Solution of a Differential Equation of First Order but not of First Degree | K3 |
| CO4 | Evaluate the Higher Order Linear Differential equations for both Homogeneous and Non -Homogeneous | K5 |
| CO5 | Implement and Apply the Appropriate Methods for Solving Higher order Differential Equations | K3 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO2 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO3 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO5 | 3 | 3 | 3 | 3 | - | - | - | 3 |

## Course Objectives:

The Objectives of a differential equation Course are to teach students how to identify

Types of differential equations and use appropriate methods to solve them, Solve first

Order differential equations using standard methods, develop a qualitative understanding

Of the nature of differential equations, their solutions and their applications, learn qualitative

Techniques for obtaining information about solutions to differential equations and learn

Analytical techniques for solving commonly occurring differential equation

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC "B$^{+}$" Grade with 2.67 CGPA )

I B.Sc Mathematics ( w.e.f 2023-24)

**Paper III, Syllabus for II semester**

**Differential Equations**

---

**UNIT - I:** (12 Hours)**Differential equations of first order and first degree**

Bridge Course- Basics of Differential equations and Integration (No question to be given from this portion)

Linear differential equations; Differential equations reducible to linear form; Exact differential equations; Integrating factors.

**UNIT – II** (12 Hours) **Differential Equations of first order but not of the first degree :**

Equations solvable for p, Equations solvable for y, Equations solvable for x, Equations homogenious in x and y, Equations of the first degree in x and y- Clairaut's Equation.

**UNIT-III:** (12 Hours) **Higher order linear differential equations I**

Solution of homogeneous linear differential equations of order n with constant coefficients; Solution of the non-homogeneous linear differential equations with constant coefficients by means of polynomial operators.

General Solution of f(D)y=0

General Solution of f(D)y=Q, where Q is a function of x.

$\frac{1}{f(D)}$ is Expressed as partial fractions.

P.I. of f(D)y = Q when Q= $be^{ax}$

P.I. of f(D)y = Q when Q = b sin ax or b cos ax.

**UNIT-IV:** (12 Hours) **Higher order linear differential equations II**

Solution of the non-homogeneous linear differential equations with constant coefficients.

P.I. of f(D)y = Q when Q= $bx^{k}$

P.I. of f(D)y = Q when Q= $e^{ax}V$ ,where V is a function of x.

P.I. of f(D)y = Q when Q= $xV$ ,where V is a function of x.

P.I. of f(D)y = Q when Q= $x^{m}V$ ,where V is a function of x.

**UNIT-V:** (12 Hours) **Higher order linear differential equations III**

Method of Variation of Parameters; Linear Differential Equations with Non-Constant Coefficients, The Cauchy-Euler equation, Legendre's linear equations.

**ADDITIONAL INPUT: Orthogonal trajectories**

**Prescribed Text Book:** (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )

**Reference Books:** (1) Ordinary and Partial Differential Equations Raisinghania, published by S. Chand & Company, New Delhi.

(2) Differential Equations with applications and programs – S. Balachandra Rao & HR Anuradha- universities press.

(3) Differential Equations and Their Applications by Zafarpublished by Prentice-Hall of India Learning Pvt. Ltd. New Delhi-

Second edition. **Suggested Activities**:Seminar/ Quiz/ Assignments

**SEMESTER- II**

**BLUE PRINT**

Time: 3Hrs. Max. Marks: 60

**PART-I(5 x 4 = 20 M)**

**Answer any FIVE Questions, each question carries FIVE marks.**

| | |
|---|---|
| Differential equations of first order and first degree | : 2 questions |
| Differential equations of the first order but not of the first degree | : 1 question |
| Higher order Linear differential equations I | : 2 question |
| Higher order Linear differential equations II | : 2 questions |
| Higher order Linear differential equations III | : 1 questions |

**PART-II(5 x 8 M= 40 M)**

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**

**Each question carries 10 marks.**

**Note: Under SECTION-A (Q.NO:13) & SECTION-B (Q.NO:14) will be given from UNIT-III.**

**SECTION-A**

| | |
|---|---|
| Differential equations of the first order and first degree | : 2 questions |
| Differential equations of the first order but not of the first degree | : 2 questions |
| Higher order Linear differential equations I | : 1 question |

**SECTION-B**

| | |
|---|---|
| Higher order Linear differential equations I | : 1 question |
| Higher order Linear differential equations II | : 2 questions |
| Higher order Linear differential equations III | : 2 questions |

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )

I B.Sc. Mathematics – Semester – II - Paper III

Differential Equations

Model Question Paper ( w. e. f 2023-2024)

---

**Time: 3Hrs** **Marks: 60**

## PART-I

**Answer any FIVE Questions, each question carries FOUR marks.** 5x4M =20M

1. Solve $\left[y\left(1+\frac{1}{x}\right)+\text{Cos } y\right]dx+[x+\log x-x\sin y]dy=0.$
2. Solve $(1-x^2)\frac{dy}{dx}+2xy=x\sqrt{1-x^2}.$
3. Solve $x^2(y-px)=p^2y.$
4. Solve $(D^2-3D+2)y = \text{Cos } hx.$
5. Solve $(D^2-4D+3)y=x^3.$
6. Solve $(D^2+4)y = x \sin x$
7. $(x\sin x+\cos x)\frac{d^2y}{dx^2}-x\cos x\frac{dy}{dx}+y\cos x=0.$
8. Solve $(x^2D^2+2xD-12)y=x^3(\log x).$

## PART-II

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**

**Each question carries 10 marks.** 5x08M = 40M

### SECTION – A

9. Solve $(2x^2y-3y^2)\,dx+(2x^3-12xy+\log y)dy=0.$
10. Solve $\frac{dy}{dx}+\frac{y}{x}=y^2\,x\sin x\,,x>0.$
11. Solve $y+px=p^2x^4$
12. Solve $p^2+2py\cot x=y^2.$
13. Solve $(D^2-4D+3)\,y=\sin 3x\cos 2x$

### SECTION-B

14. Solve $(D^2+9)y=\cos^3 x.$
15. Solve $(D^2+3D+2)y=xe^x\sin x.$
16. Solve $(D^2-4D+1)y=e^{2x}\cos^2 x.$
17. Solve $[(1+x)^2D^2+(1+x)D+1]\,y = 4\cos\log(1+x)$
18) Solve $(D^2+a^2)y = \tan ax$ by the method of variation of parameters

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme Semester I B.Sc.Mathematics(H) II Semester | | | |
|---|---|---|---|---|---|
| Course Code | Paper-IV- Solid Geometry | | | | |
| Teaching | Hours Allocated: 60 (Theory and Activities) (5 Hrs/wk) | L | T | P | C |
| Pre-requisites | Basic Knowledge about Coordinates, Planes, Straight Lines, Spheres and Cones | 4 | 1 | - | 4 |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Apply Planes and Systems of Planes in real life environment Problems | K3 |
| CO2 | Use the Detailed idea of Lines in real life Problems | K3 |
| CO3 | Implement and Apply Spheres and Their Properties in real life Problems | K3 |
| CO4 | Derive the System of Spheres and Coaxial System of Spheres | K6 |
| CO5 | Classify Various Types of Cones and applications of cones in real life Problems | K4 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | 2 | - | - | 3 |
| CO2 | 3 | 3 | 3 | 3 | 2 | - | - | 3 |
| CO3 | 3 | 3 | 3 | 3 | 2 | - | - | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO5 | 3 | 3 | 3 | 3 | 2 | - | - | 3 |

**COURSE OBJECTIVES:**

.1. **Introduce the student to the concepts of three dimensional coordinates.**

**2. Train the students to identify three dimensional objects like Plane, Straight line, Sphere, Cone with their mathematical equations using analytical methods.**

**3. To enhance problem solving skills.**

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC "B$^+$ Grade with 2.67 CGPA )**

**I B.Sc Mathematics ( w.e.f 2023-24)**

**Paper IV, Syllabus for II semester**

**Analytical Solid Geometry**

---

**UNIT – I (12 hrs) : The Plane :**

Equation of plane in terms of its intercepts on the axis, Equations of the plane through the given points, Length of the perpendicular from a given point to a given plane, Bisectors of angles between two planes, Combined equation of two planes, Orthogonal projection on a plane.

**UNIT – II (12 hrs) : The Line :**

Equation of a line; Angle between a line and a plane; The condition that a given line may lie in a given plane; The condition that two given lines are coplanar; Number of arbitrary constants in the equations of straight line; Sets of conditions which determine a line; The shortest distance between two lines; The length and equations of the line of shortest distance between two straight lines; Length of the perpendicular from a given point to a given line.

**UNIT – III (12 hrs) : Sphere :**

Definition and equation of the sphere; Equation of the sphere through four given points; Plane sections of a sphere; Intersection of two spheres; Equation of a circle; Sphere through a given circle; Intersection of a sphere and a line; Power of a point; Tangent plane; Plane of contact; Polar plane; Pole of a Plane; Conjugate points; Conjugate planes.

**UNIT – IV(12 hrs):Sphere&Cones :**

Angle of intersection of two spheres; Conditions for two spheres to be orthogonal; Radical plane; Coaxial system of spheres; limiting points.

Definitions of a cone; vertex; guiding curve; generators; Equation of the cone with a given vertex and guiding curve; Equations of cones with vertex at origin are homogenous; Condition that the general equation of the second degree should represent a cone; Condition that a cone may have three mutually perpendicular generators.

**UNIT – V (12 hrs) Cones:**

Enveloping cone of a sphere , Right circular cone, Equation of the right circular cone with a given vertex; axis and semi-vertical angle. Condition that a cone may have three mutually perpendicular generators.Intersection of a line and a quadric cone; Tangent lines and tangent plane at a point; Condition that a plane may touch a cone; Reciprocal cones; Intersection of two cones with a common vertex.

**Prescribed Text Book:** (1) A Text Book of B.Sc Mathematics Volume-I (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )

**Reference Books :**


**1.** Analytical Solid Geometry by Shanti Narayan and P.K. Mittal, Published by S. Chand & Company Ltd. 7th Edition.

**2.** A text Book of Analytical Geometry of Three Dimensions, by P.K. Jain and Khaleel Ahmed, Published by Wiley Eastern Ltd., 1999.

**3.** Co-ordinate Geometry of two and three dimensions by P. Balasubrahmanyam, K.Y. Subrahmanyam, G.R. Venkataraman published by Tata-MC Gran-Hill Publishers Company Ltd., New Delhi.


**Suggested Activities**: Seminar/ Quiz/ Assignments / Group discussins

## SEMESTER-II
## BLUE PRINT

Time: 3Hrs. Max. Marks:60

### PART-I(5 x 4 = 20 M)

**Answer any FIVE Questions, each question carries FIVE marks.**

| | |
|---|---|
| Unit-I (The Plane) | : 2 question |
| Unit-II(The Line) | : 1 questions |
| Unit-III(The Sphere) | : 2 questions |
| Unit-IV(The Sphere & Cones) | : 2 questions |
| Unit-V (The Cones) | : 1 question |

### PART-II(5 x 8 M= 40 M)

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**

**Each question carries 10 marks.**

### SECTION-A

| | |
|---|---|
| Unit-I (The Plane) | : 2 questions |
| Unit-II (The Line) | : 2 questions |
| Unit-III (The Sphere) | : 1 question |

### SECTION-B

| | |
|---|---|
| **Unit-III(The Sphere)** | **: 1 question** |
| Unit-IV (The Sphere & Cones) | : 2 questions |
| Unit-V (The Cones) | : 2 questions |

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC $B^+$ Grade with 2.67 CGPA)**

**I B.Sc. Mathematics – Semester – II - Paper IV**

**Solid Geometry**

**Model Question Paper ( w. e. f 2023-2024)**

Time: 3Hrs **Max Marks: 60**

## PART-I

**Answer any FIVE Questions, each question carries FIVE marks. 5x4M =20M**

1. Prove that the equation of the plane through the points (1,-2,4) and (3,-4,5) and parallel to x-axis is y +2z =6.
2. Find the equations of the straight line passing through the point (1,0,-1) and intersecting the lines $4x - y - 13 = 0 = 3y - 4z - 1; y - 2z + 2 = 0 = x - 5$.
3. Prove that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$; $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar, also find their point of intersection.
4. Find the equation of the sphere circumscribing the tetrahedron whose faces are x = 0, y = 0, z = 0 and $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$.
5. Find the pole of the plane x+2y+3z= 7 w.r.t the sphere $x^2 + y^2 + z^2 - 2x - 4y - 6z + 11 = 0$.
6. Find the equation of the sphere through the circle $x^2 + y^2 + z^2 - 2x + 3y - 4z + 6 = 0$, 3x-4y+5z-15=0 and cutting the sphere $x^2 + y^2 + z^2 + 2x + 4y - 6z + 11 = 0$ orthogonally.
7. Find the equation to the cone whose vertex is (1,1,0) and whose guiding curve is $y = 0$, $x^2 + z^2 = 4$.
8. Show that the reciprocal cone of $ax^2 + by^2 + C^2 = 0$ is the cone $\frac{x^2}{a} + \frac{y^2}{b} + \frac{z^2}{c} = 0$.

## PART-II

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**
**Each question carries 10 marks. 5x08M = 40M**

### SECTION – A

9. Find the equations of the planes bisecting the angles between the planes 3x-6y+2z+5=0, 4x-12y+3z-3=0 also point out which the plane bisects the acute angle.
10. A variable plane is at a constant distance p from the origin and meets the axis in A,B,C show that the locus of the centroid of the tetrahedrom OABC is $x^{-2} + y^{-2} + z^{-2} = 16p^{-2}$.
11. Find the image of the line $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ in the plane x+y+z=1.
12. Find the shortest distance and equations of the line S.D between the lines 3x-9y+5z=0=x + y – z and 6x+8y+3z-10 = 0 = x+2y+z -3.
13. Find the equations of the spheres passing through the circle $x^2 + y^2 = 4, z = 0$ and is intersected by the plane $x + 2y + 2z = 0$ in a circle of radius 3.

## SECTION-B

14. Show that the two circles $x^2 + y^2 + z^2 - y + 2z = 0, x - y + z = 2$ and $x^2 + y^2 + z^2 + x - 3y + z - 5 = 0, 2x - y + 4z - 1 = 0$ lie on the same sphere and find its equation.
15. If $r_1, r_2$ are the radii of two orthogonal spheres, then show that the radius of the circle of their intersection is $\frac{r_1 r_2}{\sqrt{(r_1^2 + r_2^2)}}$.
16. Prove that the angle between the lines of intersection of the plane x+y+z=0 with the cone ayz+bzx+cxy=0 is $\frac{\pi}{3}$ if $\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0$
17. Show that the equation of quadric cone which contains the three coordinate axes and the lines in which the plane x-5y-3z=0 cuts the cone $7x^2 + 5y^2 - 3z^2 = 0$ is yz+10zx+18xy=0.
18. Find the equation of the right circular cone whose vertex is the origin, axis as the line x = t, y = 2t, z = 3t and whose semi-vertical angle is $60^0$.

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme Semester II B.Sc.(MPC,MPCs,MCCs) III Semester | | | |
|---|---|---|---|---|---|
| **Course Code** | **Course-3: Abstract Algebra** | | | | |
| **Teaching** | **Hours Allocated: 60 (Theory ) (6 Hrs/wk)** | **L** | **T** | **P** | **C** |
| **Pre-requisites** | **Basic knowledge about Number Theory** | **5** | **1** | **-** | **5** |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Analyze and demonstrate examples of subgroups, Normal subgroups & Quotient groups | K4 |
| CO2 | Evaluate the concepts of homomorphism and isomorphism for groups | K5 |
| CO3 | To Use Various Canonical types of groups in real life problems | K3 |
| CO4 | To determine the concepts of cyclic groups and permutations | K3 |
| CO5 | To determine the ring theory concepts with the help of Knowledge in Group theory and to prove the theorems and use applications in real life Problems | K3 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO2 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO3 | 3 | 3 | 3 | 3 | 3 | - | - | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO5 | 3 | 3 | 3 | 3 | 3 | - | - | 3 |

**COURSE OBJECTIVES:**

1. This course helps to gain skill in problem solving and critical thinking.

2. An introduction to the basic concepts of modern algebra. Topics include the nature of proofs, sets and equivalence relations, binary operations, groups and subgroups, cyclic groups and groups of Permutations.

3. Get the significance of the notation of the normal .

4. Study the homomorphisms and Isomorphisms.

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC B$^+$ Grade with 2.67 CGPA )**

**II B.Sc Mathematics ( w.e.f 2020-21A.Y.)**

**Paper III, Syllabus for III semester**

**Abstract Algebra**

---

**UNIT – 1 : (10 Hrs) Groups**

Binary Operation – Algebraic structure – semi group-monoid – Group definition and elementary properties Finite and Infinite groups – examples – order of a group. Composition tables with examples.

**UNIT – 2 : (14 Hrs) Subgroups, Co-Sets and Lagrange's Theorem**

Complex Definition – Multiplication of two complexes Inverse of a complex-Subgroup definition – examples-criterion for a complex to be a subgroups.

Criterion for the product of two subgroups to be a subgroup-union and Intersection of subgroups.

Cosets Definition – properties of Cosets–Index of a subgroups of a finite groups–Lagrange's Theorem.

**UNIT –3 : (12 Hrs) Normal Subgroups**

Definition of normal subgroup – proper and improper normal subgroup–Hamilton group – criterion for a subgroup to be a normal subgroup – intersection of two normal subgroups – Sub group of index 2 is a normal sub group – simple group – quotient group – criteria for the existence of a quotient group.

**UNIT-4 Homomorphism:**

Definition of homomorphism – Image of homomorphism elementary properties of homomorphism – Isomorphism – automorphism definitions and elementary properties–kernel of a homomorphism – fundamental theorem on Homomorphism and applications.

**Permutation Group:**

Definition of permutation – permutation multiplication – Inverse of a permutation – cyclic permutations – transposition – even and odd permutations – Cayley's theorem.

.

**UNIT – 5 : (14 Hrs) Rings:**

Definition of Ring and basic properties, Boolean Rings, divisors of zero and cancellation laws Rings, Integral Domains, Division Ring and Fields, The characteristic of a ring - The characteristic of an Integral Domain, The characteristic of a Field. Sub Rings.

**Prescribed Text Book:** A Text Book of B.Sc Mathematics Volume-II (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )

**Reference Books :**

**1.** A. First course in Abstract Algebra, by J.B. Fraleigh Published by Narosa Publishinghouse.

**2.** Modern Algebra by M.L. Khanna.

**Suggested Activities**: Seminar/ Quiz/ Assignments /Group discussions/project works

**SEMESTER-III**
**BLUE PRINT**

Time: 3Hrs. Max. Marks:60

**PART-I (5 x 4 = 20 M)**

**Answer any FIVE Questions, each question carries FOUR marks.**

| | |
|---|---|
| Groups | : 2 question |
| Subgroups, Co-sets & Lagrange's theorem | : 1 question |
| Normal Sub groups | : 2 questions |
| Homomorphism &Permutation | : 2 questions |
| Rings | : 1 questions |

**PART-II(5 x 8 M= 40 M)**

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**
**Each question carries 08 marks.**

**SECTION-A**

| | |
|---|---|
| Groups | : 2 questions |
| Subgroups, Co-sets & Lagrange's theorem | : 2 questions |
| Normal Subgroups | : 1 question |

**SECTION-B**

| | |
|---|---|
| Normal subgroups | : 1 question |
| Homomorphism& permutation | : 2 questions |
| Rings | : 2 questions |

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC $B^+$ Grade with 2.67 CGPA points)**

**II B.Sc. Mathematics – Semester – III - Paper III**
**Abstract Algebra**
**Model Question Paper (w. e. f 2021-2022)**

---

**Time:3Hrs**
**MaxMarks:75**

## PART-I

**Answer any FIVE Questions, each question carries FOUR marks. 5x4M =20M**

1. Show that the set $Q^+$ of all positive rational numbers forms an abelian group under the composition "o" defined by $a \circ b = \frac{ab}{3} \forall a, b \in Q^+$
2. Find order of an element of a group G={1, -1, I, -i}
3. If H is any subgroup of a group G, then prove that $H^{-1}=H$.
4. A Subgroup H of a group G is normal iff $XHX^{-1} = H$ for every x €G
5. Prove that every sub group of an abelian group is normal.
6. Let G be a multiplicative group and f : G →G such that for a ∈ G, $f(a)=a^{-1}$, then prove that f is one-one onto and f is homomorphism iff G is commutative.
7. Find the order of the cycle ( 1 4 5 7).
8. Prove that Every Field is an Integral domain.

## PART-II

**Answer any FIVE questions. Choosing at least TWO questions from each section.**
**Each question carries 08 marks. 5x08M = 40M**

### SECTION – A

9. Prove that in a group G, for a, b, x, y ∈ G the equation ax=b and ya=b have unique solutions.
10. Prove that the set Z of all integers form an abelian group w.r.t. the operations defined by a0b=a+b+2 for all a,b € Z.
11. H is a non empty complex of a group G. The necessary and sufficient condition for H to be a subgroup of G is a,b € H => $ab^{-1}$ € H, where $b^{-1}$ is the inverse of b in G
12. State and prove Lagrange's theorem
13. Prove that a subgroup H of a group G is a normal subgroup of G iff the product of two right cosets of H in G is again a right cost of H in G.

### SECTION-B

14. Prove that a subgroup H of a group G is a normal subgroup of G iff each left co-set of H in G is a right co-set of H in G.
15. State and prove Fundamental theorem of homomorphism on groups
16. State and prove Cayley's theore
17. Prove that Every finite Integral domain is a Field
18. Prove that the characteristic of an Integral domain is either a prime or zero.

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme Semester II B.Sc.(MPC,MPCs,MCCs) IV Semester | | | |
|---|---|---|---|---|---|
| Course Code | Course-4: Real Analysis | | | | |
| Teaching | Hours Allocated: 60 (Theory ) (6 Hrs/wk) | L | T | P | C |
| Pre-requisites | Basic knowledge about Real number System | 5 | 1 | - | 5 |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Apply Sequence term theorems to applications of Real number system | K3 |
| CO2 | Use the definition of convergence as they apply to sequences and Series | K3 |
| CO3 | Apply Mean Value theorems to the context of Real numbers | K3 |
| CO4 | Examine the Continuity and differentiability for Riemann Integration of functions | K3 |
| CO5 | Develop Fundamental theorems to the functions | K6 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO2 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO3 | 3 | 3 | 3 | 3 | | - | - | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO5 | 3 | 3 | 3 | 3 | | - | - | 3 |

**COURSE OBJECTIVES:**

1. **In Mathematics the branch of Real Analysis studies the behaviour of Real Numbers, Sequences and Series of Real numbers, and Real Functions.**
2. **Real Analysis studies the behaviour of Limits and Continuous Functions.**
3. **Real Analysis studies the behaviour of Riemann Integral Functions**

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

## (Accredited with NAAC B$^+$ Grade with 2.67 CGPA )

**II B.Sc Mathematics ( w.e.f 2021-22)**

**Paper IV, Syllabus for IV semester**

**Real Analysis**

---

**UNIT – I (12 hrs) : REAL NUMBERS**

The algebraic and order properties of R, Absolute value and Real line, Completeness property of R, Applications of supreme property; intervals. (**No. Question is to be set from this portion)**

**Real Sequences (**10 Marks-2, 5 Marks-2**)**

Sequences and their limits, Range and Boundedness of Sequences, Limit of a sequence and Convergent sequence.

The Cauchy's criterion, properly divergent sequences, Monotone sequences, Necessary and Sufficient condition for Convergence of Monotone Sequence, Limit Point of Sequence, Subsequences and the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence theorem.

**UNIT –II (12 hrs) : INFINITIE SERIES**

**Series :** Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Canchy's $n^{th}$ root test or Root Test.
3. D-Alembert's Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence, semi convergence.

**UNIT – III (12 hrs) : CONTINUITY**

**Limits :** Real valued Functions, Boundedness of a function, Limits of functions. Some extensions of the limit concept, Infinite Limits. Limits at infinity. **(No. Question is to be set from this portion)**

**Continuous functions :** Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

**UNIT – IV (12 hrs) : DIFFERENTIATION & MEAN VALUE THEOREMS**

The derivability of a function on an interval at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem.

**UNIT – V (12 hrs) : RIEMANN INTEGRATION**

Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, First mean value theorem.

**REFERENCE TEXT BOOKS :**

**1.**"Introduction to Real Analysis" by RABERT g BARTELY and .D.R. SHERBART Published by John Wiley.

**2.** Elements of Real Analysis on per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisinghania Published by S. Chand & Company Pvt. Ltd., New Delhi.

**Suggested Activities**:Seminar/ Quiz/ Assignments /Group discussions/project works

**SEMESTER-IV**
**BLUE PRINT**

Time: 3Hrs. Max. Marks:60

**PART-I(5 x 4 = 20 M)**

**Answer any FIVE Questions, each question carries FOUR marks.**

| | |
|---|---|
| Real Sequences | : 2 questions |
| Infinite Series | : 1 questions |
| Continuity | : 2 question |
| Differentiation | : 2 questions |
| Riemann Integration | : 1 question |

**PART-II(5 x 8 M= 40 M)**

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**

**Each question carries 08 marks.**

**SECTION-A**

| | |
|---|---|
| Real Sequences | : 2 questions |
| Infinite Series | : 2 questions |
| Continuity | : 1 question |

**SECTION-B**

| | |
|---|---|
| Continuity | :1 question |
| Differentiation & Generalized Mean value theorems | : 2 questions |
| Riemann Integration | : 2 questions |

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )**

**II B.Sc. Mathematics – Semester –IV - Paper IV**

**Real Analysis**

**Model Question Paper ( w.e.f 2021-22)**

Time: 3Hrs Max Marks: 60

## PART-I

**Answer any FIVE Questions, each question carries FIVE marks.** 5x4M =20M

1. Prove that every convergent sequence is a Cauchy sequence.
2. Prove that $\lim\left[\frac{1}{(n+1)^2}+\frac{1}{(n+2)^2}+\cdots+\frac{1}{(n+n)^2}\right]=0$
3. Test for the convergence of $\sum_{n=2}^{\infty}\frac{\log n}{2n^3-1}$
4. Let f:R→R be such that $f(x)=\frac{e^{\frac{1}{x}}-e^{\frac{-1}{x}}}{e^{\frac{1}{x}}+e^{\frac{-1}{x}}}$ if x ≠ 0 and f(0)=1 discuss the continuity at x=0.
5. If f:S→R is continuous at a €S then |f| is continuous at a€S
6. Prove that $f(x) = e^x$ is derivable at every a€ R
7. Discuss the applicability of Rolle's theorem $f(x) = x^3 - 6x^2 + 11x - 6$; a=1, b=3
8. Find L(P,f) and U(P,f) if f(x)= x on [0,1] and p ={0,1/3,2/3, 1}

## PART-II

**Answer any FIVE questions. Choosing at least TWO questions from each section.**
**Each question carries 08 marks.** **5x8M = 40M**

### SECTION – A

9. Prove that a monotone sequence is convergent iff it is bounded.
10. State and Prove Cauchy's general principle of convergence.
11. State and Prove D-Alembert's test.
12. State and Prove Cauchy's $n^{th}$ root test.
13. Examine the Continuity of f defined by $f(x) = |x| + |x-1|$ at x=0,1.

### SECTION-B

14. State and Prove Darboux's theorem.
15. State and Prove Cauchy's mean value theorem
16. Show that f(x) = | x-1| + | x-2| is continuous but not derivable at x=1,2
17. If f: [a, b] → R is monotonic on [a, b], then prove that f is integrable on [a, b].
18. State and Prove First mean value theorem.

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme Semester II B.Sc.(MPC,MPCs,MCCs) IV Semester | | | |
|---|---|---|---|---|---|
| Course Code | Course-5: LINEAR ALGEBRA | | | | |
| Teaching | Hours Allocated: 60 (Theory ) (6 Hrs/wk) | L | T | P | C |
| Pre-requisites | Basic knowledge about Vector Space System | 5 | 1 | - | 5 |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Understand the Concepts of Vector Spaces, Subspaces, Basis, Dimension and their Properties | K2 |
| CO2 | Determine the Concepts of Linear transformations and their Properties | K3 |
| CO3 | Apply Cayley Hamilton Theorem to the Problems for finding inverse of a matrix | K3 |
| CO4 | Learn the Properties of Inner Product Space and use in Inner Product Spaces | K3 |
| CO5 | Determine Orthogonality in Inner Product Spaces | K3 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 1 | 2 | 2 | - | - | - | 1 |
| CO2 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO3 | 3 | 3 | 3 | 3 | | - | - | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO5 | 3 | 3 | 3 | 3 | | - | - | 3 |

**COURSE OBJECTIVES:**

1. In Mathematics Linear Algebra Studies applications of Vector Spaces.
2. Linear Algebra is considered a basic concept in modern Presentation of Geometry.
3. Linear Algebra helps to define the basic objects such as Planes, Lines and Rotation of The object.

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )**

**II B.Sc Mathematics ( w.e.f 2021-22)**
**Paper V, Syllabus for IV semester**

## LINEAR ALGEBRA

---

**UNIT – I (12 hrs) : Vector Spaces-I**

Vector Spaces, General properties of vector spaces, n-dimensional Vectors, addition and scalar multiplication of Vectors, internal and external composition, Null space, Vector subspaces, Algebra of subspaces, Linear Sum of two subspaces, linear combination of Vectors, Linear span Linear independence and Linear dependence of Vectors.

**UNIT –II (12 hrs) : Vector Spaces-II**

Basis of Vector space, Finite dimensional Vector spaces, basis extension, co-ordinates, Dimension of a Vector space, Dimension of a subspace, Quotient space and Dimension of Quotientspace.

**UNIT –III (12 hrs) : Linear Transformations**

Linear transformations, linear operators, Properties of L.T, sum and product of LTs, Algebra of Linear Operators, Range and null space of linear transformation, Rank and Nullity of linear transformations – Rank – Nullity Theorem.

**UNIT –IV (12 hrs) : Matrix(10Marks-2, 5Marks-1)**

Linear Equations, Characteristic Roots, Characteristic Values & Vectors of square Matrix, Cayley – Hamilton Theorem.

**UNIT –V (12 hrs) : Inner product space(10Marks-2, 5Marks-2)**

Inner product spaces, Euclidean and unitary spaces, Norm or length of a Vector, Schwartz inequality, Triangle in Inequality, Parallelogram law, Orthogonality, Orthonormal set, complete orthonormal set, Gram – Schmidt orthogonalisation process. Bessel's inequality and Parseval's Identity.

**ADDITIONAL INPUT**: **Vector Space Isomorphism**

**Prescribed Text Books:**

(1) A Text Book of B.Sc Mathematics Volume-III (S.Chand & Company)
(V.Venkateswara Rao, N.Krishnamurthy, B.V.S.S.Sarma, S.Anjaneya Sastry )

**Reference Books :**


1. Linear Algebra by J.N. Sharma and A.R. Vasista, published by Krishna Prakashan Mandir, Meerut- 250002.
2. Matrices by Shanti Narayana, published by S.Chand Publications.
3. Linear Algebra by Kenneth Hoffman and Ray Kunze, published by Pearson Education (low priced edition), New Delhi.
4. Linear Algebra by Stephen H. Friedberg et al published by Prentice Hall of India Pvt. Ltd. $4^{th}$ Edition 2007.


**Suggested Activities**:

Seminar/ Quiz/ Assignments/ Project on "Applications of Linear algebra Through Computer Sciences"

## SEMESTER-IV

## BLUE PRINT

Time: 3Hrs. Max. Marks:60

### PART-I (5 x 4 = 20 M)

**Answer any FIVE Questions, Each question carries FOUR Marks.**

| | |
|---|---|
| Vector Spaces-I | : 2 questions |
| Vector Spaces – II | : 1 question |
| Linear Transformations | : 2 questions |
| Matrix | : 2 question |
| Inner Product Spaces | : 1questions |

### PART-II(5 x 8 M= 40 M)

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**
**Each question carries 8 Marks.**

### SECTION-A

| | |
|---|---|
| Vector Spaces-I | : 2 questions |
| Vector Spaces-II | : 2 questions |
| Linear Transformations | : 1 question |

### SECTION-B

| | |
|---|---|
| Linear Transformations | : 1 question |
| Matrix | : 2 questions |
| Inner Product Spaces | : 2 questions |

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )**

**II B.Sc. Mathematics – Semester IV - Paper V**

**Linear Algebra**

**Model Question Paper ( w. e. f 2021-2022)**

**Time: 3Hrs** **Max Marks: 60**

**PART-I**

**Answer any FIVE Questions, each question carries FOUR Marks. 5x4M =20M**

1. Prove that the intersection of any two sub spaces of vector space is also a subspace.
2. Determine whether the set of vectors {(1,-2,1),(2,1,-1),(7,-4,1)} are L.D or L.I.
3. Show that the set {(1,2,1),(2,1,0),(1,-1,2)} forms a basis of $V_3(F)$.
4. Show that the mapping $T:V_3(R)\rightarrow V_2(R)$ is defined by T(x,y,z) = (x-y, x-z) is a linear transformation.
5. Let U(F) and V(F) be two vector spaces and T : U → V is a linear transformation, then prove that the null space N(T) is a subspace of U(F).
6. Prove that square matrices A and $A^1$ have the same characteristic values.
7. Find Eigen roots and corresponding eigen vectors of the matrix $A=\begin{bmatrix}1 & 4\\ 3 & 2\end{bmatrix}$
8. State and prove Triangle inequaliy.

**PART-II**

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**

**Each question carries 10 marks. 5x8M = 40M**

**SECTION – A**

9. Let V(F) be a vector space. A non empty set $W \subseteq V$. Prove that the necessary and sufficient condition for W to be a subspace of V is a, b ∈ F and $\alpha,\beta \in V \Rightarrow a\alpha+b\beta \in W$.
10. If $W_1$ and $W_2$ are two subspaces of a vector space V(F), then prove that $L(W_1 \cup W_2) = W_1 + W_2$.
11. Let $W_1, W_2$ be two subspaces of a finite dimensional vector space V(F), then $\dim(W_1 + W_2) = \dim W_1 + \dim W_2 - \dim(W_1 \cap W_2)$
12. Let W be a subspace of a finite dimensional vector space V(F), then show that $\dim \frac{V}{W} = \dim V - \dim W$.
13. State and prove Rank Nullity theorem

**SECTION-B**

14. Describe explicitly of the linear transformation $T : \mathbf{R}^2 \rightarrow \mathbf{R}^2$ such that T(2,3)=(4,5) and T(1,0)=(0,0).
15. State and prove Cayley Hamilton theorem
16. Find the Eigen values and eigen vectors of the matrix $\begin{bmatrix}3 & 10 & 5\\ -2 & -3 & -4\\ 3 & 5 & 7\end{bmatrix}$
17. State and prove Bessel's inequality.
18. Apply Gram-Schmidt process to the vectors {(1,0,1), (1,0,-1), (0,3,4)} to obtain an orthonormal basis of $V_3(R)$ with the standard inner product.

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme Semester III B.Sc.(MPC,MPCs,MCCs &MSDs) & V Semester | | | |
|---|---|---|---|---|---|
| **Course Code** | **Course-6: Numerical Methods** | | | | |
| **Teaching** | **Hours Allocated: 60 (Theory ) (6 Hrs/wk)** | **L** | **T** | **P** | **C** |
| **Pre-requisites** | **Basic knowledge about errors, functions** | **5** | **1** | **-** | **5** |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Understand the subject of various numerical methods that are used to Obtain approximate solutions | K2 |
| CO2 | Understand various finite difference concepts and interpolation methods | K2 |
| CO3 | Solve Numerical differentiation and Numeical Integration by using Various Methods | K5 |
| CO4 | Solve Numerical solutions of ordinary differential equations by using Various Numerical methods | K3 |
| CO5 | Evaluate and Analyze the accuracy of Numerical Methods | K5 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 1 | - | - | - | 1 |
| CO2 | 3 | 1 | 2 | 1 | - | - | - | 1 |
| CO3 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO5 | 3 | 3 | 3 | 3 | - | - | - | 3 |

**COURSE OBJECTIVES :**

1. **The main objective of this course is to provide concepts of numerical techniques for solving different types of equations and developing algorithms for solving scientific problems**.
2. **To provide the numerical methods of solving the non-linear equations, interpolation, differentiation, and integration.**

3. **The *objectives* of studying this module are to make the students familiarise with the ways of solving complicated *mathematical* problems numerically**

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )

III B.Sc Mathematics ( w.e.f 2022-23)

**Syllabus for V semester**

**Course-6A: Numerical Methods**

## Unit – 1: Finite Differences and Interpolation with Equal intervals (15h)

1. Introduction, Forward differences, Backward differences, Central Differences, Symbolic relations, nth Differences of Some functions,
2. Advancing Difference formula, Differences of Factorial Polynomial, Summation ofSeries.
3. Newton's formulae for interpolation. Central Difference Interpolation Formulae.

## Unit – 2: Interpolation with Equal and Unequal intervals (15h)

1. Gauss's Forward interpolation formulae, Gauss's backward interpolation formulae, Stirling'sformula, Bessel's formula.
2. Interpolation with unevenly spaced points, divided differences and properties, Newton'sdivided differences formula.
3. Lagrange's interpolation formula, Lagrange's Inverse interpolation formula.

## Unit – 3: Numerical Differentiation (15h)

1. Derivatives using Newton's forward difference formula, Newton's back ward difference formula,
2. Derivatives using central difference formula, Stirling's interpolation formula,
3. Newton's divided difference formula, Maximum and minimum values of a tabulatedfunction

## Unit – 4: Numerical Integration (15h)

1. General Quadrature formula one errors, Trapezoidal rule,
2. Simpson's1/3– rule, Simpson's 3/8 – rule, and Weddle's rules,
3. Euler – Maclaurin Formula of summation and quadrature, The Euler transformation.

## Unit – 5: Numerical solution of ordinary differential equations (15h)

1. Introduction, Solution by Taylor's Series,
2. Picard's method of successive approximations,
3. Euler's method, Modified Euler's method, Runge – Kutta methods.

## III. References:


1. S.S.Sastry, Introductory Methods of Numerical Analysis, Prentice Hall of India Pvt. Ltd., New Delhi-110001, 2006.
2. P.Kandasamy, K.Thilagavathy, Calculus of Finite Differences and Numerical Analysis.
   S. Chand & Company, Pvt. Ltd., Ram Nagar, New Delhi-110055.
3. R.Gupta, Numerical Analysis, Laxmi Publications (P) Ltd., New Delhi.
4. H.C Saxena, Finite Differences and Numerical Analysis, S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
5. S.Ranganatham, Dr.M.V.S.S.N.Prasad, Dr.V.Ramesh Babu, Numerical Analysis,
   S. Chand & Company Pvt. Ltd., Ram Nagar, New Delhi-110055.
6. Web resources suggested by the teacher and college librarian including reading material.


## IV. Co-Curricular Activities:

### A) Mandatory:

**1. For Teacher:** Teacher shall train students in the following skills for 15 hours, by taking relevant outside data (Field/Web).

1. Applications of Newton's forward and back ward difference formulae.
2. Applications of Gauss forward and Gauss back ward, Stirling's and Bessel's formulae.
3. Applications of Newton's divided differences formula and Lagrange's interpolation formula.
4. Various methods to find the approximation of a definite integral.
5. Different methods to find solutions of Ordinary Differential Equations.

**2. For Student: Fieldwork/Project work;** Each student individually shall undertake Fieldwork/Project work and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following**,** by choosing any one of the aspects.

1. Collecting the data from the identified sources like Census department or Electricity department, by applying the Newton's, Gauss and Lagrange's interpolation formula, making observations and drawing conclusions. (Or)
2. Selection of some region to find the area by applying Trapezoidal rule, Simpson's1/3– rule, Simpson's 3/8 – rule, and Weddle's rules. Comparing the solutions with analytical solution and concluding which one is the best method. (Or)

3.Findingsolutionof the ODE by Taylor's Series, Picard's method of successive approximations, Euler's method, Modified Euler's method, Runge–Kutta methods. Comparing the solutions with analytical solution, selecting the best method.

**3. Max. Marks for Fieldwork/Project work Report: 05.**

**4. Suggested Format for Fieldwork/Project work Report**: Title page, Student Details, Index page, Stepwise work-done, Findings, Conclusions and Acknowledgements.

**5. Unit tests (IE).**

**b) Suggested Co-Curricular Activities**:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.

Invited lectures and presentations on related topics by experts in the specified area.

**Suggested Question Paper Pattern:**

**Max.Marks:75** **Time:3 hrs**

**SECTION- A** (Total: 5 X 5=25Marks)

(Answer any **five questions**. Each answer carries **5 Marks)**

| | |
|---|---|
| 1. | UNIT-1 |
| 2. | UNIT-1 |
| 3. | UNIT-2 |
| 4. | UNIT-3 |
| 5. | UNIT-4 |
| 6. | UNIT-4 |
| 7. | UNIT-5 |
| 8. | UNIT-5 |

**SECTION-B** (Total: 5 X 10 = 50 Marks)

(Answer ALL the questions. Each question carries **10 Marks)**

**ANSWER ATLEAST TWO QUESTIONS FROM EACH PART**

**PART-A**

**UNIT- I - 2 QUESTIONS**
**UNIT-II - 2 QUESTIONS**
**UNIT-III - 1 QUESTION**

**PART-B**

**UNIT-III - 1 QUESTION**
**UNIT-IV - 2 QUESTIONS**
**UNIT-V - 2 QUESTIONS**

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )

III B.Sc Mathematics ( w.e.f 2022-23)

**Syllabus for V semester**

**Course-6A: Numerical Methods**

**MODEL PAPER** **TIME: 3Hrs**

**Max Marks:75M**

**SECTION-A**

**ANSWER ALL QUESTIONS. EACH QUESTION CARRIES 5 MARKS** **5X5=25M**

1. Prove that $\sqrt{(1+\delta^2}\,\mu^2) = 1 + \frac{1}{2}\delta^2$
2. Prove that $\Delta = \frac{1}{2}\delta^2 + \delta[1 + \frac{\delta^2}{4}]^{\frac{1}{2}}$
3. If $f(x) = \frac{1}{x}$ then find f (a,b).where f(a,b) is the first divided difference.
4. Using the following table compute $\frac{dy}{dx}$ at x=1.

| x | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|---|---|---|---|
| y | 1 | 8 | 27 | 64 | 125 | 216 |

5. Calclulate $\int_0^1 \frac{1}{1+x}\,dx$ by using Trapezoidal rule
6. Evaluate $\int_0^1 \frac{1}{1+x^2}\,dx$ by Simpson's $\frac{1}{3}$ rule
7. If $\frac{dy}{dx} = \frac{y-x}{y+x}$ and y=1 when x=0, find y at x = 0.1 by Euler's method
8. If $\frac{dy}{dx} = x + y^2$, y(0) =1, find Picard's second approximation.

## PART-II

**Answer any FIVE questions. Choosing atleast TWO questions from each section.**
**Each question carries 10 marks.** 5x10M = 50M

## SECTION – A

9. State and prove Newton's Gregory Forward Interpolation Formula
10. Give that sin 45 =0.7071, sin 50= 0.7660, sin55 = 0.8192, sin60= 0.8660, Find the value of sin52?
11. State and Prove Gauss Forward Interpolation Formula.
12. State and Prove Lagrange's Interpolation Formula
13. Find the maximum and the minimum values of the function y = f(x) from the following data.

| x | 0 | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| y | 0 | 0.25 | 0 | 2.25 | 16 | 56.25 |

## SECTION-B

14. Find $f^1(1.5)$ from the following table

| x | 0 | 0.5 | 1 | 1.5 | 2 |
|---|---|---|---|---|---|
| f(x) | 0.3989 | 0.3521 | 0.2420 | 0.1295 | 0.0540 |

15. State and prove Trapezoidal Rule.
16. Evaluate $\int_0^1 \frac{1}{1+x^2}\,dx$ by using Simpson's $\frac{3}{8}$ rule and hence find the approximate value of $\prod$
17. Use Runge Kutta method of fourth order to find an approximate value of y when x=0.1and x=0.2 given that x=0 when y=1 and $\frac{dy}{dx} = x + y$
18. Using the Euler's modified method, find y(0.2) for $\frac{dy}{dx} = x + |\sqrt{y}|$ with y(0)=1.

| | SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL | Programme Semester III B.Sc.(MPC,MPCs,MCCs &MSDs) & V Semester | | | |
|---|---|---|---|---|---|
| Course Code | Course-7: Mathematical Special Functions | | | | |
| Teaching | Hours Allocated: 60 (Theory ) (6 Hrs/wk) | L | T | P | C |
| Pre-requisites | Basic knowledge about Derivatives and Integrals | 5 | 1 | - | 5 |

| CO | Course Outcomes | Knowledge Level |
|---|---|---|
| CO1 | Understand the Beta and Gamma Functions, their Properties and relation Between these two functions, Understand orthogonal Properties of Chebshev Polynomials and recurrence relations. | K2 |
| CO2 | Solve Power series solutions of ordinary differential equations | K3 |
| CO3 | Solve Hermite equation and write the Hermite Polynomial of order n, Study the orthogonal properties of Hermite Polynomials and recurrence Relations. | K3 |
| CO4 | Solve Legendre Equation and Understand the orthogonal Properties , Generating functions of Legendre Polynomials. | K3 |
| CO5 | Solve Bessel's Equations and Understand the Orthogonal Properties, Generating functions of Bessel's Equations. | K3 |

**CO-PO Mapping**

| CO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 |
|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | 1 | 2 | 1 | - | - | - | 1 |
| CO2 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO3 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO4 | 3 | 3 | 3 | 3 | - | - | - | 3 |
| CO5 | 3 | 3 | 3 | 3 | - | - | - | 3 |

**COURSE OBJECTIVES:**

**The Main Objective of this Course is to Understand the Properties of Special Functions, Understand the Concept of Bessel's Function, Hermite Function, Legendre Function, Chebshey Polynomials with its Properties like Recurrence Relations, Orthogonal Properties, Generating Functions, Rodrigue's Formulae.**

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC $B^+$ Grade with 2.67 CGPA )

III B.Sc Mathematics ( w.e.f 2022-23)

**Syllabus for V semester**

**Course-7A: Mathematical Special Functions**

## Unit – 1: Beta and Gamma functions, Chebyshev polynomials (15h)

1. Euler's Integrals-Beta and Gamma Functions, Elementary properties of Gamma Functions, Transformation of Gamma Functions.
2. Another form of Beta Function, Relation between Beta and Gamma Functions.
3. Chebyshev polynomials, orthogonal properties of Chebyshev polynomials, recurrence relations, generating functions for Chebyshev polynomials.

## Unit – 2: Power series and Power series solutions of ordinary differential equations (15h)

1. Introduction, summary of useful results, power series, radius of convergence, theorems on Power series
2. Introduction of power series solutions of ordinary differential equation
3. Ordinary and singular points, regular and irregular singular points, power series solution.

## Unit – 3: Hermite polynomials (15h)

1. Hermite Differential Equations, Solution of Hermite Equation, Hermite polynomials, generating function for Hermite polynomials.
2. Other forms for Hermite Polynomials, Rodrigues formula for Hermite Polynomials, to find first few Hermite Polynomials.
3. Orthogonal properties of Hermite Polynomials, Recurrence formulae for Hermite Polynomials.

## Unit – 4: Legendre polynomials (15h)

1. Definition, Solution of Legendre's equation, Legendre polynomial of degree n, generating function of Legendre polynomials.
2. Definition of $P_n(x)$ and $Q_n(x)$, General solution of Legendre's Equation (derivations not required) to show that $\mathrm{Pn}(x)$ is the coefficient of $h^n$, in the expansion of of $(1 - 2\mathrm{xh} + \mathrm{h}^{2)^{\frac{-1}{2}}}$
3. Orthogonal properties of Legendre's polynomials, Recurrence formulas for Legendre'sPolynomials.

**Unit – 5: Bessel's equation** (15h)

1. Definition, Solution of Bessel's equation, Bessel's function of the first kind of order n, Bessel's function of the second kind of order n.
2. Integration of Bessel's equation in series form=0, Definition of $J_n(x)$, recurrence for mulae for $J_n(x)$.
3. Generating function for $J_n(x)$, orthogonally of Bessel functions.

   **ADDITIONAL INPUT: Rodrigue's formula and its applications**

## II. Reference Books:


1. Dr.M.D.Raisinghania, Ordinary and Partial Differential Equations, S. Chand & CompanyPvt. Ltd., Ram Nagar, New Delhi-110055.
2. J.N.Sharma and Dr.R.K.Gupta, Differential equations with special functions, KrishnaPrakashan Mandir.
3. Shanti Narayan and Dr.P.K.Mittal, Integral Calculus, S. Chand & Company Pvt. Ltd., RamNagar, New Delhi-110055.
4. George F.Simmons, Differential Equations with Applications and Historical Notes, Tata McGRAW-Hill Edition, 1994.
5. Shepley L.Ross, Differential equations, Second Edition, John Willy & sons, New York,1974.


Web resources suggested by the teacher and college librarian including reading material

## IV. Co-Curricular Activities:

### A) Mandatory:

**1. For Teacher:** Teacher shall train students in the following skills for 15 hours, by taking relevant outside data (Field/Web).

1. Beta and Gamma functions, Chebyshev polynomials.
2. Power series, power series solutions of ordinary differential equations,
3. Procedures of finding series solutions of Hermite equation, Legendre equation andBessel equation.
4. Procedures of finding generating functions for Hermite polynomials, LegendrePolynomials and Bessel's function.

**2. For Student: Fieldwork/Project work;** Each student individually shall undertake Fieldwork/Project work, make observations and conclusions and submit a report not exceeding 10 pages in the given format on the work-done in the areas like the following**,** by choosing any one of the aspects.

**1.** Going through the web sources like Open Educational Resources on the properties of Beta and Gamma functions, Chebyshev polynomials, power series solutions of ordinary differential equations. (or)

**2.** Going through the web sources like Open Educational Resources on the properties of series solutions of Hermite equation, Legendre equation and Bessel equation.

**3. Max. Marks for Fieldwork/Project work Report: 05.**

**4. Suggested Format for Fieldwork/Project work Report**: Title page, Student Details, Index page,

Stepwise work-done, Findings, Conclusions and Acknowledgements.

**5. Unit tests (IE).**

**b) Suggested Co-Curricular Activities**:

1. Assignments/collection of data, Seminar, Quiz, Group discussions/Debates
2. Visits to research organizations, Statistical Cells, Universities, ISI etc.
3. Invited lectures and presentations on related topics by experts in the specified area.

**Suggested Question Paper Pattern:**

**Max.Marks:75** **Time:3 hrs**

**SECTION-A** (Total: 5 X 5=25Marks)

(Answer any **five questions**. Each answer carries **5 Marks)**

| | |
|---|---|
| 1. | UNIT-1 |
| 2. | UNIT-1 |
| 3. | UNIT-2 |
| 4. | UNIT-3 |
| 5. | UNIT-4 |
| 6. | UNIT-4 |
| 7. | UNIT-5 |
| 8. | UNIT-5 |

**SECTION-B** (Total: 5 X 10 = 50 Marks)

(Answer ALL the questions. Each question carries **10 Marks)**

**ANSWER ATLEAST TWO QUESTIONS FROM EACH PART**

**PART-A**

**UNIT- I - 2 QUESTIONS**
**UNIT-II - 2 QUESTIONS**
**UNIT-III - 1 QUESTION**

**PART-B**

**UNIT-III - 1 QUESTION**
**UNIT-IV - 2 QUESTIONS**
**UNIT-V - 2 QUESTIONS**

# SRI A.S.N.M. GOVERNMENT COLLEGE (A), PALAKOL. W.G.DT

(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)

(Accredited with NAAC B $^{+}$Grade with 2.67 CGPA)

III B.Sc Mathematics ( w.e.f 2022-23)

**Course-7A: Mathematical Special Functions**

**MODEL PAPER**

**TIME: 3Hrs** **Max Marks:75M**

**SECTION-A**

**ANSWER ALL QUESTIONS. EACH QUESTION CARRIES 5 MARKS** **5X5=25M**

1. Evaluate $\int_0^a x^4\sqrt{(a^2-x^2)}\,dx$
2. $prove\ that\ T_{n+1}(x) - 2xT_n(x) + T_{n-1}(x) = 0$
3. $find\ the\ radius\ of\ convergence\ of\ the\ series\ \frac{x}{2} + \frac{1.3}{2.5}x^2 + \frac{1.3.5}{2.5.8}x^3 + \ldots$
4. $prove\ that\ H_n'(x) = 2n\,H_{n-1}(x), n \geq 1.$
5. prove that $(2n+1)xP_n = (n+1)P_{n+1} + nP_{n-1}$
6. $Show\ that\ \ (i)P_n(1) = 1, (ii)P_n(-x) = (-1)^n P_n(x)$
7. $show\ that\ \frac{d}{dx}(x^{-n}\,J_n(x) = -x^{-n}\,J_{n+1}(x)$
8. show that $J_{-\frac{1}{2}}(x) = \sqrt{\left(\frac{2}{\pi x}\right)}\cos x$

## PART-II

**Answer any FIVE questions. Choosing at least TWO questions from each section.**
**Each question carries 10 marks.** 5x10M = 50M

## SECTION – A

9. Prove that $\beta(l,m) = \frac{\Gamma(l)\Gamma(m)}{\Gamma(l+m)}$
10. Show that $2^n\Gamma\left(n+\frac{1}{2}\right) = 1.3.5\ldots(2n-1)\sqrt{\pi}$
11. $If\ a\ power\ series\ \sum a_n x^n\ converges\ for\ x = x_0, then$
    $(i)\ it\ is\ absolutely\ converges\ in\ the\ interval\ |x| < |x_0|$
    $(ii)\ it\ is\ uniformly\ converges\ in\ the\ interval\ |x| < |x_1|, where\ |x_1| < |x_0|$
12. $Find\ the\ power\ series\ solution\ of\ the\ equation\ (x^2+1)y'' + xy' - xy = 0$
    $in\ powers\ of\ x\ (i.e.\ about\ x = 0).$
13. $Prove\ that\ \int_{-\infty}^{\infty} e^{-x^2} H_n(x)H_m(x)dx = \begin{cases} 0 & \text{if } m \neq n \\ 2^n\sqrt{\pi}\,n! & \text{if } m = n \end{cases}$

## SECTION-B

14. *Prove that* $2n\,Hn(x) = 2n\,H_{n-1}(x) + H_{n+1}(x)$

15. (i) *Prove that* $\int_{-1}^{1} P_m(x)P_n(x)dx = 0$ if $m \neq n$ (ii) $\int_{-1}^{1}[P_n(x)]^2dx = \frac{2}{2n+1}$ if $m = n$

16. *prove that* $(2n + 1)xP_n = (n + 1)P_{n+1} + nP_{n-1}$

17. Prove that $J_n^1(x) = nJ_n(x) - xJ_{n+1}(x)$

18. *P.T* $J_n(x)$ *is the Coefficient of* $z^n$ *in the expansion of* $e^{(z-\frac{1}{z})/2}$ *Also prove that* $J_n(x)$ *is the coefficient. of* $z^{-n}$ *multiplied by* $(-1)^n$

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC B$^+$ Grade with 2.67 CGPA)**

**LIFE SKILL COURSE - ANALYTICAL SKILLS**

**Syllabus, For all Degree Programmes.**

**Semester – III ( w.e.f. 2021-22 )**

(Total 30 Hrs)

**Course Objective:** Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

**Course Outcomes:**

After successful completion of this course, the student will be able to;

1) Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.
2) Acquire competency in the use of verbal reasoning.
3) Apply the skills and competencies acquired in the related areas
4) Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

**UNIT – I** :

**Arithmetic ability: (10 Questions)**

Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).

**Verbal Reasoning : (10 Questions)**

Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

**UNIT – II** :

**Quantitative aptitude (10 Questions)**

Averages, Ratio and proportion, Problems on ages, Time-distance – speed.

**Business computations (10 Questions)**

Percentages, Profit &loss, Partnership, simple compound interest.

**UNIT – 3**:

**Data Interpretation: (2 Questions)**

Tabulation, Bar Graphs, Pie Charts, Line Graphs, Venn diagram.

**Reference Books:**


1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude : Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, Kiran Prakasan publishers
4. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw hill publications. Old question Paper of the exams conducted by (Wipro, TCS, Infosys, Etc) at their recruitment process, source-Internet.

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC B$^+$ Grade with 2.67 CGPA )**

**LIFE SKILL COURSE - ANALYTICAL SKILLS**

**SEMESTER-III**

Model Question Paper (for 2020-23 batch w. e. f 2021-2022)

**Time: 2Hrs** **Max Marks: 50**

**Answer ALL the questions. Each question carries ONE mark.** **50 x 1 =50M**

## SECTION-A(Unit-I & II)

1. Solve 5172.49+378.352+ x = 9318.678
   (a) 7637.683 (b) 7367.368 (c) 3767.836 (d) 7763.638
2. Solve 0.014 x 0.014 = ?
   (a) 0.000196 (b) 0.00196 (c) 19.6 (d) 196
3. Find the value of $2-[2-\{2-2(2+2)\}]$
   (a) – 4 (b) 4 (c) 6 (d) None of these
4. Evaluate $\frac{8-[5-(-3+2)]\div 2}{|5-3|-|5-8|\div 3}$
   (a) 2 (b) 3 (c) 4 (d) 5
5. $\frac{4335}{4(?)24} \div 1\frac{7}{8} = \frac{289}{528}$ Find the missing digit in place of ' ? '
   (a) 1 (b) 2 (c) 8 (d) None of these
6. Which of the following has fractions in ascending order?
   (a) $\frac{2}{3},\frac{3}{5},\frac{7}{9},\frac{9}{11},\frac{8}{9}$ (b) $\frac{3}{5},\frac{2}{3},\frac{9}{11},\frac{7}{9},\frac{8}{9}$ (c) $\frac{3}{5},\frac{2}{3},\frac{7}{9},\frac{9}{11},\frac{8}{9}$ (d) $\frac{8}{9},\frac{9}{11},\frac{7}{9},\frac{2}{3},\frac{3}{5}$
7. The sum of all two digit numbers divisible by 5 is
   (a) 1035 (b) 1245 (c) 1230 (d) 945
8. The largest 4 digit number exactly divisible by 88 is
   (a) 9944 (b) 9768 (c) 9988 (d) 8888
9. Find the L.C.M of 16, 24, 36 and 54
   (a) 433 (b) 432 (c) 324 (d) 234
10. The L.C.M. of $\frac{1}{3},\frac{5}{6},\frac{2}{9},\frac{4}{27}$ is :
    (a) $\frac{1}{54}$ (b) $\frac{10}{27}$ (c) $\frac{20}{3}$ (d) None of these
11. 1, 9, 25, 49, ?, 121
    (a) 64 (b) 81 (c) 91 (d)100
12. 589654237, 89654237, 8965423, 965423, ?
    (a) 58965 (b) 65423 (c) 89654 (d) 96542
13. CIRCLE is related to RICELC in the same way as SQUARE is related to
    (a) QSUERA (b) QUSERA (c) UQSAER (d) UQSERA
14. In a certain code, BRAIN is written as * % ÷ # × and TIER is written as $ # + %. How is RENT written in that code?
    (a) % × # $ (b) % # × $ (c) % + × $ (d) + × % $
15. B is the husband of P. Q is the only grandson of E, who is wife of D and mother-in-law of P. How is B related to D ?
    (a) Nephew (b) Cousin (c) Son-in-law (d) Son

16. E is the son of A. D is the son of B. E is married to C. C is B's daughter. How is D related to E?
    (a) Brother (b) Uncle (c) Father-in-law
    (d) Brother –in-law (e) None of these
17. How many times do the hands of a clock coincide in a day?
    (a) 20 (b) 21 (c) 22 (d) 24

18. How many times in a day, are the hands of a clock in straight line but opposite in direction?
    (a) 20 (b) 22 (c) 24 (d) 48
19. What was the day of the week on 16th July, 1776?
    (a) Monday (b) Wednesday (c) Tuesday (d) Saturday
20. On 6th march, 2005 Monday falls. What was the day of the week on 6th March, 2004.
    (a) Sunday (b) Saturday (c) Tuesday (d) Wednesday
21. Find the average of all prime numbers between 30 and 50
    (a) 40 (b) 41 (c) 55.5 (d) 39.8
22. A batsman makes a score of 87 runs in the 17th innings and thus increases his average by 3. Find his average after 17th inning.
    (a)38 (b) 40 (c) 45 (d) 39
23. If A : B = $\frac{1}{2}$ : $\frac{1}{8}$ , B : C = $\frac{1}{3}$ : $\frac{5}{9}$ and C : D = $\frac{5}{6}$ : $\frac{3}{4}$, then the ratio A : B : C : D is :
    (a) 4 : 6 : 8 : 10 (b) 6 : 4 : 8 : 10(c) 6 : 8 : 9 : 10(d) 8 : 6 : 10 : 9
24. If 0.75 : x : : 5 : 8 , then x is equal to
    (a) 1.12 (b) 1.20 (c) 1.25 (d) 1.30
25. Present ages of Sammer and Anand are in the ratio of 5: 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years?
    (a) 24 (b) 27 (c) 40 (d) Cannot be determined (e) None of these
26. Sachin is younger than Rahul by 4 years. If their ages are in the respective ratio of 7 : 9, how old is Sachin?
    (a) 16 years (b) 18 years (c) 28 years
    (d) cant be determined (e) None of these
27. A cyclist covers a distance of 750m in 2 min 30 sec. What is the speed in km/hr of the cyclist?
    (a)18 km /hr (b) 20 km /hr (c) 22 km /hr (d) 25 km
28. A train covers a distance of 10 km in 12 minutes. If its speed is decreased by 5 km / hr the time taken by it to cover the same distance will be :
    (a) 10 min (b) 11 min 20 sec (c) 13 min (d) 13 min 20 sec
29. A thief steals a car at 2.30 p.m. and drives it at 60kmph. The theft is discovered at 3 p.m. and the owner sets off in another car at 75kmph. When will he overtake the thief?
    (a) 4.30 p.m. (b) 4.45 p.m. (c) 5 p.m. (d) 5.15p.m.

30. A man's speed with the current is 15kmph and the speed of the current is 2.5kmph. The man's speed against the current is
    (a) 8.5kmph (b) 9kmph (c) 10kmph (d) 12.5kmph
31. What is 15% of Rs.34?
    (a) Rs. 3.40 (b) Rs.3.75 (c) Rs.4.50 (d) Rs.5.10
32. 65 % of ? = 20% of 422.50
    (a) 84.5 (b) 130 (c) 139.425 (d) 200
33. If on selling 12 notebooks, a seller makes a profit equal to the selling price of 4 note books, what is his percent profit?
    (a) $16\frac{2}{3}$ (b) 25 (c) 50 (d) Data inadequate (e) None of these
34. A, B and C enter into a partnership with a capital in which A's contribution is Rs.10,000. If out of a total profit of Rs.1000, A gets Rs.500 and B gets Rs.300, then C's capital is :
    (a) Rs.4000 (b) Rs.5000 (c) Rs.6000 (d) Rs.9000
35. P and Q started a business investing Rs.85,000 and Rs.15,000 respectively. In what ratio the profit earned after 2 years be divided between P and Q respectively?
    (a) 3 : 4 (b) 3 : 5 (c) 15 : 23 (d) 17 : 23 (e) None of these
36. Reena and Shaloo are partners in a business. Reena invests Rs. 35,000 for 8 months and Shaloo invests Rs.42,000 for 10 months. Out of a profit of Rs.31,750, Reena's share is :
    (a) Rs.9471 (b) Rs.12,628 (c) Rs.18,040 (d) Rs.18,942
37. A sum of Rs.12,500 amounts to Rs.15,500 in 4 years at the rate of simple interest. What is the rate of interest?
    (a) 3% (b) 4% (c) 5% (d) 6% (e) None of these
38. The differences between the simple interest received from two different sources on Rs.1500 for 3 years is Rs.13.50. The difference between their rates of interest is :
    (a) 0.1 % (b) 0.2% (c) 0.3% (d) 0.4% (e) None of these
39. Find the compound interest on Rs.10,000 in 2 years at 4% per annum, the interest being compounded half-yearly.
    (a) Rs.852.23 (b) Rs.824.32 (c) Rs.258.94 (d) Rs.843.16
40. Rs.800 becomes Rs.956 in 3 years at a certain rate of simple interest. If the rate of interest is increased by 4%, what amount will Rs.800 become in 3 years?
    (a) Rs.1020.80 (b) Rs.1025 (c) Rs.1052
    (d) Data inadequate (e) None of these

## SECTION – B (Unit – III)
## (Q.No 41 – 45 )

Study the following table carefully and answer the questions given below.

**Classification of 100 students based on the marks obtained by them in Physics and Chemistry in an Examination**

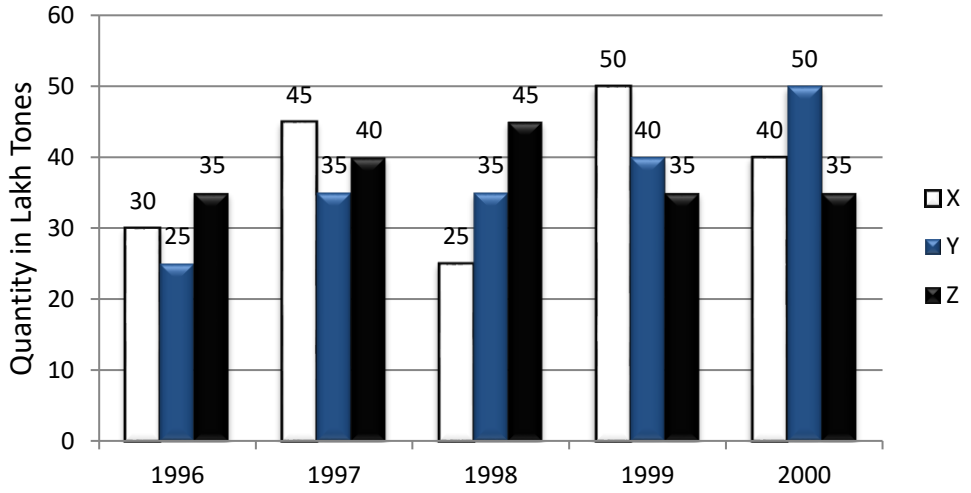
| Marks out of 50 / Subject | 40 and Above | 30 and Above | 20 and Above | 10 and Above | 0 and Above |
|---|---|---|---|---|---|
| Physics | 9 | 32 | 80 | 92 | 100 |
| Chemistry | 4 | 21 | 66 | 81 | 100 |
| Average | 7 | 27 | 73 | 87 | 100 |

41. The number of students scoring less than 40% marks in aggregate is:
    (a)13 (b) 19 (c) 20 (d) 27 (e) 34
42. If at least 60% marks in Physics are required for pursuing higher studies in Physics, how many students will be eligible to pursue higher studies in Physics?
    (a)27 (b) 32 (c) 34 (d) 41 (e) 68
43. What is the difference between the number of students passed with 30 as cut-off marks in Chemistry and those passed with 30 as cut-off marks in aggregate?
    (a) 3 (b) 4 (c) 5 (d) 6 (e) 7
44. The percentage of the number of students getting at least 60% marks in Chemistry over those getting at least 40% marks in aggregate, is approximately:
    (a) 21% (b) 27% (c) 29% (d) 31% (e) 34%
45. If it is known that at least 23 students were eligible for a symposium on Chemistry, the minimum qualifying marks in Chemistry for eligibility to Symposium would lie in the range :
    (a) 40 -50 (b) 30-40 (c) 20-30 (d) Below 20 (e) Cannot be determined

**(Q.No 46 – 50 )**

. The bar graph provided below gives the data of the production of paper (in lakh tones) by three different companies X,Y and Z over the years. Study the graph and answer the questions that follow.

**Production of Paper (in lakh tones) by three companies X,Y and Z over the years**




46. What is the difference between the production of Company Z in 1998 and Company Y in 1996?
(a) 2,00,000 tons (b) 20,00,000 tons (c) 20,000 tons (d) 2,00,00,000 tons
(e) None of these

47. What is the ratio of the average production of Company X in the period 1998-2000 to the average production of Company Y in the same period?
(a) 1 : 1 (b) 15 : 17 (c) 23 : 25 (d) 27 : 29 (e) None of these

48. What is the percentage increase in the production of Company Y from 1996 to 1999?
(a) 30% (b) 45% (c) 50% (d) 60% (e) 75%

49. The average production for five years was maximum for which company?
(a) X (b) Y (c) Z (d) X and Y both (e) X and Z both

50. In which year was the percentage of production of Company Z to the production of Company Y the maximum?
(a) 1996 (b) 1997 (c) 1998 (d) 1999 (e) 2000

# SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC B$^+$ Grade with 2.67 CGPA)**

**SKILL ENHANCEMENT COURSE - ANALYTICAL SKILLS**

**Syllabus, For all Degree Programmes.**

**Semester – I ( w.e.f. 2023-24 )**

(Total 30 Hrs)

**Course Objective:** Intended to inculcate quantitative analytical skills and reasoning as an inherent ability in students.

**Course Outcomes:**

After successful completion of this course, the student will be able to;

1) Understand the basic concepts of arithmetic ability, quantitative ability, logical reasoning, business computations and data interpretation and obtain the associated skills.
2) Acquire competency in the use of verbal reasoning.
3) Apply the skills and competencies acquired in the related areas
4) Solve problems pertaining to quantitative ability, logical reasoning and verbal ability inside and outside the campus.

**UNIT – I** :

**Arithmetic ability: (10 Questions)**

Algebraic operations BODMAS, Fractions, Divisibility rules, LCM & GCD (HCF).

**Verbal Reasoning : (10 Questions)**

Number Series, Coding & Decoding, Blood relationship, Clocks, Calendars.

**UNIT – II** :

**Quantitative aptitude (10 Questions)**

Averages, Ratio and proportion, Problems on ages, Time-distance – speed.

**Business computations (10 Questions)**

Percentages, Profit &loss, Partnership, simple compound interest.

**UNIT – 3**:

**Data Interpretation: (2 Questions)**

Tabulation, Bar Graphs, Pie Charts, Line Graphs, Venn diagram.

**Reference Books:**


1. Quantitative Aptitude for Competitive Examination by R S Agrawal, S.Chand publications.
2. Quantitative Aptitude and Reasoning by R V Praveen, PHI publishers.
3. Quantitative Aptitude : Numerical Ability (Fully Solved) Objective Questions, Kiran Prakashan, Pratogitaprakasan, Kic X, Kiran Prakasan publishers
4. Quantitative Aptitude for Competitive Examination by Abhijit Guha, Tata Mc Graw hill publications. Old question Paper of the exams conducted by (Wipro, TCS, Infosys, Etc) at their recruitment process, source-Internet.

**SRI A.S.N.M. GOVERNMENT COLLEGE(A), PALAKOL. W.G.DT**

**(Affiliated to Adikavi Nannaya University, Rajahmahendravaram)**

**(Accredited with NAAC B⁺ Grade with 2.67 CGPA**

**SKILL ENHANCEMENT COURSE - ANALYTICAL SKILLS**

**SEMESTER-I**

Model Question Paper (w. e. f 2023-2024)

---

**Time: 2Hrs** **Max Marks: 50**

**Answer ALL the questions. Each question carries ONE mark.** **50 x 1 =50M**

## SECTION-A(Unit-I & II)

1. Solve 5172.49+378.352+ x = 9318.678
   (b) 7637.683 (b) 7367.368 (c) 3767.836 (d) 7763.638
2. Solve 0.014 x 0.014 = ?
   (b) 0.000196 (b) 0.00196 (c) 19.6 (d) 196
3. Find the value of $2 - [2 - \{2 - 2(2 + 2)\}]$
   (b) – 4 (b) 4 (c) 6 (d) None of these
4. Evaluate $\frac{8-[5-(-3+2)]\div 2}{|5-3|-|5-8|\div 3}$
   (b) 2 (b) 3 (c) 4 (d) 5
5. $\frac{4335}{4(?)24} \div 1\frac{7}{8} = \frac{289}{528}$ Find the missing digit in place of ' ? '
   (b) 1 (b) 2 (c) 8 (d) None of these
6. Which of the following has fractions in ascending order?
   (b) $\frac{2}{3}, \frac{3}{5}, \frac{7}{9}, \frac{9}{11}, \frac{8}{9}$ (b) $\frac{3}{5}, \frac{2}{3}, \frac{9}{11}, \frac{7}{9}, \frac{8}{9}$ (c) $\frac{3}{5}, \frac{2}{3}, \frac{7}{9}, \frac{9}{11}, \frac{8}{9}$ (d) $\frac{8}{9}, \frac{9}{11}, \frac{7}{9}, \frac{2}{3}, \frac{3}{5}$
7. The sum of all two digit numbers divisible by 5 is
   (a) 1035 (b) 1245 (c) 1230 (d) 945
8. The largest 4 digit number exactly divisible by 88 is
   (a) 9944 (b) 9768 (c) 9988 (d) 8888
9. Find the L.C.M of 16, 24, 36 and 54
   (b) 433 (b) 432 (c) 324 (d) 234
10. The L.C.M. of $\frac{1}{3}, \frac{5}{6}, \frac{2}{9}, \frac{4}{27}$ is :
    (b) $\frac{1}{54}$ (b) $\frac{10}{27}$ (c) $\frac{20}{3}$ (d) None of these
11. 1, 9, 25, 49, ?, 121
    (b) 64 (b) 81 (c) 91 (d)100
12. 589654237, 89654237, 8965423, 965423, ?
    (b) 58965 (b) 65423 (c) 89654 (d) 96542
13. CIRCLE is related to RICELC in the same way as SQUARE is related to
    (b) QSUERA (b) QUSERA (c) UQSAER (d) UQSERA
14. In a certain code, BRAIN is written as * % ÷ # × and TIER is written as $ # + %. How is RENT written in that code?
    (a) % × # $ (b) % # × $ (c) % + × $ (d) + × % $
15. B is the husband of P. Q is the only grandson of E, who is wife of D and mother-in-law of P. How is B related to D ?

(b) Nephew (b) Cousin (c) Son-in-law (d) Son

16. E is the son of A. D is the son of B. E is married to C. C is B's daughter. How is D related to E?
    (b) Brother (b) Uncle (c) Father-in-law
    (d) Brother –in-law (e) None of these
17. How many times do the hands of a clock coincide in a day?
    (b) 20 (b) 21 (c) 22 (d) 24

18. How many times in a day, are the hands of a clock in straight line but opposite in direction?
    (b) 20 (b) 22 (c) 24 (d) 48
19. What was the day of the week on 16$^{th}$ July, 1776?
    (b) Monday (b) Wednesday (c) Tuesday (d) Saturday
20. On 6$^{th}$ march, 2005 Monday falls. What was the day of the week on 6$^{th}$ March, 2004.
    (a) Sunday (b) Saturday (c) Tuesday (d) Wednesday
21. Find the average of all prime numbers between 30 and 50
    (b) 40 (b) 41 (c) 55.5 (d) 39.8
22. A batsman makes a score of 87 runs in the 17$^{th}$ innings and thus increases his average by 3. Find his average after 17$^{th}$ inning.
    (a)38 (b) 40 (c) 45 (d) 39
23. If A : B = $\frac{1}{2}$ : $\frac{1}{8}$ , B : C = $\frac{1}{3}$ : $\frac{5}{9}$ and C : D = $\frac{5}{6}$ : $\frac{3}{4}$, then the ratio A : B : C : D is :
    (a) 4 : 6 : 8 : 10 (b) 6 : 4 : 8 : 10(c) 6 : 8 : 9 : 10(d) 8 : 6 : 10 : 9
24. If 0.75 : x : : 5 : 8 , then x is equal to
    (b) 1.12 (b) 1.20 (c) 1.25 (d) 1.30
25. Present ages of Sammer and Anand are in the ratio of 5: 4 respectively. Three years hence, the ratio of their ages will become 11 : 9 respectively. What is Anand's present age in years?
    (b) 24 (b) 27 (c) 40 (d) Cannot be determined (e) None of these
26. Sachin is younger than Rahul by 4 years. If their ages are in the respective ratio of 7 : 9, how old is Sachin?
    (a) 16 years (b) 18 years (c) 28 years
    (d) cant be determined (e) None of these
27. A cyclist covers a distance of 750m in 2 min 30 sec. What is the speed in km/hr of the cyclist?
    (a)18 km /hr (b) 20 km /hr (c) 22 km /hr (d) 25 km
28. A train covers a distance of 10 km in 12 minutes. If its speed is decreased by 5 km / hr the time taken by it to cover the same distance will be :
    (b) 10 min (b) 11 min 20 sec (c) 13 min (d) 13 min 20 sec
29. A thief steals a car at 2.30 p.m. and drives it at 60kmph. The theft is discovered at 3 p.m. and the owner sets off in another car at 75kmph. When will he overtake the thief?
    (b) 4.30 p.m. (b) 4.45 p.m. (c) 5 p.m. (d) 5.15p.m.

30. A man's speed with the current is 15kmph and the speed of the current is 2.5kmph. The man's speed against the current is
    (a) 8.5kmph (b) 9kmph (c) 10kmph (d) 12.5kmph
31. What is 15% of Rs.34?
    (b) Rs. 3.40 (b) Rs.3.75 (c) Rs.4.50 (d) Rs.5.10
32. 65 % of ? = 20% of 422.50
    (b) 84.5 (b) 130 (c) 139.425 (d) 200
33. If on selling 12 notebooks, a seller makes a profit equal to the selling price of 4 note books, what is his percent profit?
    (b) $16\frac{2}{3}$ (b) 25 (c) 50 (d) Data inadequate (e) None of these
34. A, B and C enter into a partnership with a capital in which A's contribution is Rs.10,000. If out of a total profit of Rs.1000, A gets Rs.500 and B gets Rs.300, then C's capital is :
    (b) Rs.4000 (b) Rs.5000 (c) Rs.6000 (d) Rs.9000
35. P and Q started a business investing Rs.85,000 and Rs.15,000 respectively. In what ratio the profit earned after 2 years be divided between P and Q respectively?
    (b) 3 : 4 (b) 3 : 5 (c) 15 : 23 (d) 17 : 23 (e) None of these
36. Reena and Shaloo are partners in a business. Reena invests Rs. 35,000 for 8 months and Shaloo invests Rs.42,000 for 10 months. Out of a profit of Rs.31,750, Reena's share is :
    (b) Rs.9471 (b) Rs.12,628 (c) Rs.18,040 (d) Rs.18,942
37. A sum of Rs.12,500 amounts to Rs.15,500 in 4 years at the rate of simple interest. What is the rate of interest?
    (b) 3% (b) 4% (c) 5% (d) 6% (e) None of these
38. The differences between the simple interest received from two different sources on Rs.1500 for 3 years is Rs.13.50. The difference between their rates of interest is :
    (b) 0.1 % (b) 0.2% (c) 0.3% (d) 0.4% (e) None of these
39. Find the compound interest on Rs.10,000 in 2 years at 4% per annum, the interest being compounded half-yearly.
    (b) Rs.852.23 (b) Rs.824.32 (c) Rs.258.94 (d) Rs.843.16
40. Rs.800 becomes Rs.956 in 3 years at a certain rate of simple interest. If the rate of interest is increased by 4%, what amount will Rs.800 become in 3 years?
    (b) Rs.1020.80 (b) Rs.1025 (c) Rs.1052
    (d) Data inadequate (e) None of these

**SECTION – B (Unit – III)**
**(Q.No 41 – 45 )**

Study the following table carefully and answer the questions given below.

**Classification of 100 students based on the marks obtained by them in Physics and Chemistry in an Examination**

| Marks out of 50 / Subject | 40 and Above | 30 and Above | 20 and Above | 10 and Above | 0 and Above |
|---|---|---|---|---|---|
| Physics | 9 | 32 | 80 | 92 | 100 |
| Chemistry | 4 | 21 | 66 | 81 | 100 |
| Average | 7 | 27 | 73 | 87 | 100 |

41. The number of students scoring less than 40% marks in aggregate is:
(a)13 (b) 19 (c) 20 (d) 27 (e) 34

42. If at least 60% marks in Physics are required for pursuing higher studies in Physics, how many students will be eligible to pursue higher studies in Physics?
(a)27 (b) 32 (c) 34 (d) 41 (e) 68

43. What is the difference between the number of students passed with 30 as cut-off marks in Chemistry and those passed with 30 as cut-off marks in aggregate?
(a) 3 (b) 4 (c) 5 (d) 6 (e) 7

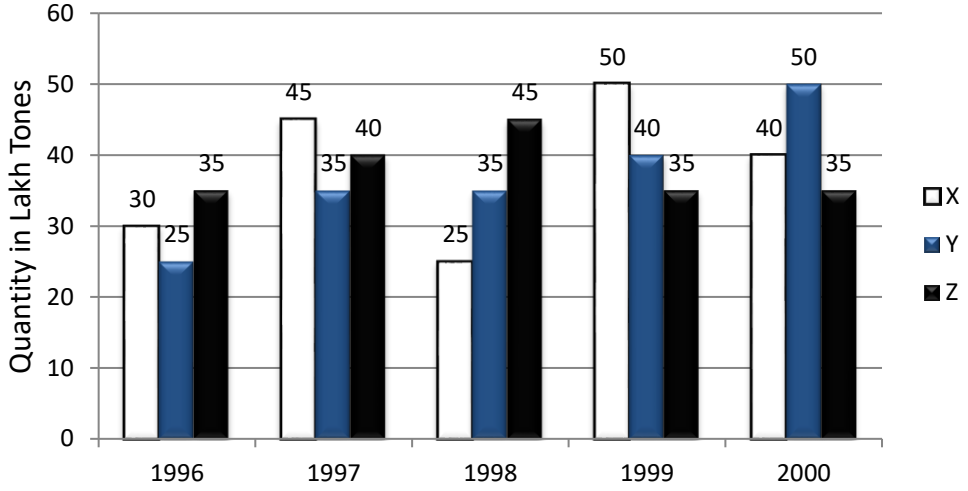
44. The percentage of the number of students getting at least 60% marks in Chemistry over those getting at least 40% marks in aggregate, is approximately:
(a) 21% (b) 27% (c) 29% (d) 31% (e) 34%

45. If it is known that at least 23 students were eligible for a symposium on Chemistry, the minimum qualifying marks in Chemistry for eligibility to Symposium would lie in the range :
(a) 40 -50 (b) 30-40 (c) 20-30 (d) Below 20 (e) Cannot be determined

**(Q.No 46 – 50 )**

. The bar graph provided below gives the data of the production of paper (in lakh tones) by three different companies X,Y and Z over the years. Study the graph and answer the questions that follow.

**Production of Paper (in lakh tones) by three companies X,Y and Z over the years**




46. What is the difference between the production of Company Z in 1998 and Company Y in 1996?
    (a) 2,00,000 tons (b) 20,00,000 tons (c) 20,000 tons (d) 2,00,00,000 tons
    (e) None of these
47. What is the ratio of the average production of Company X in the period 1998-2000 to the average production of Company Y in the same period?
    (a) 1 : 1 (b) 15 : 17 (c) 23 : 25 (d) 27 : 29 (e) None of these
48. What is the percentage increase in the production of Company Y from 1996 to 1999?
    (a) 30% (b) 45% (c) 50% (d) 60% (e) 75%
49. The average production for five years was maximum for which company?
    (a) X (b) Y (c) Z (d) X and Y both (e) X and Z both
50. In which year was the percentage of production of Company Z to the production of Company Y the maximum?
    (a) 1996 (b) 1997 (c) 1998 (d) 1999 (e) 2000