

***SAURASHTRA UNIVERSITY  
RAJKOT***

**MATHEMATICS**

**Syllabus of B.Sc. Semester-5 & 6**

**According to Choice Based Credit System**

**Effective from June - 2012**

**Syllabus of B.Sc. Semester-5**  
**According to Choice Based Credit System**  
**Effective from June - 2012**

- **Program:** B.Sc.
- **Semester:** 5
- **Subject:** Mathematics
- **Course codes:** BSMT-501(A) - Theory  
BSMT-502(A) - Theory  
BSMT-503(A) - Theory  
BSMT-501(B) - Practical  
BSMT-502(B) - Practical  
BSMT-503(B) - Practical  
1 Project
- **Total Credit Of The Semester 5:** 24 Credit

**B. Sc. MATHEMATICS SEMESTER: V**

- The Course Design of B. Sc. Sem.- V (Mathematics) according to choice based credit system (CBCS) comprising of Paper Number, Paper Name, No. of theory lectures per week, No. of practical lectures per week, total marks of the each paper are as follows :

SR.NO	SUBJECT	NO. OF THEORY LECTURE PER WEEK	NO. OF PRACTICAL LECTURE PER WEEK	TOTAL MARKS	Credit Of Each Paper.
1	PAPER BSMT-501 (A) (Theory) Mathematical Analysis-1 & Group Theory	6	-	70(External)+ 30 (Internal) = 100 Marks	4
2	PAPER BSMT-502 (A) (Theory) Programming in C & Numerical Analysis-1	6	-	70(External)+ 30 (Internal) = 100 Marks	4
3	PAPER BSMT-503 (A) (Theory) Discrete Mathematics & Complex Analysis-1	6	-	70(External)+ 30 (Internal) = 100 Marks	4
4	PAPER BSMT-501 (B) (Practical) <u>Numerical Analysis – I</u>	-	3	35(External)+ 15(Internal) = 50 Marks	3
5	PAPER BSMT-502 (B) (Practical) <u>Programming in C language</u>	-	3	35(External)+ 15(Internal) = 50 Marks	3
6	PAPER BSMT-503 (B) (Practical) <u>Programming with SCILAB</u>	-	3	35(External)+ 15(Internal) = 50 Marks	3
7	Project Work & Viva	<ul style="list-style-type: none"> <li>1 Guidance Lecture. for a group of 3 to 5 students / week.</li> <li>Evaluation of project will be in SIXTH semester</li> </ul>		The title of the project work to be decided and data will be collected in this semester	3
<b><u>Total credit of the semester V</u></b>					<b>24</b>

**Marks Distribution Of Each Paper  
for  
Theory and Practical ( for SEMESTER-V )**

- **Total Marks of Each Theory Paper [External Examination]**      **20 Marks (MCQ test)+  
50 Marks (Descr. type)=  
70 Total Marks.**
- **Total Marks of Each Theory Paper [Internal Examination]**      **10 Marks Assignments +  
10 Marks QUIZ test +  
10 Marks Internal exam. =  
30 Total Marks**
- **Total Marks of Each Practical Paper [External Examination]**      **35 Marks**
- **Total Marks of Each Practical Paper [Internal Examination]**      **15 Marks  
[Continuous internal assessment of  
practical work ]**

**Format of Question Paper**

- There shall be one question paper of **70 marks & 3 hours** for each Mathematics Theory Paper.
- There shall be **TWO sections** in this paper i.e. **Section A** and **Section B**.

**Section – A**

**Section A** is of **20 Marks** with **one hour** time duration with **20 MCQ** type questions (multiple choice questions) covering the whole syllabus in equal weightage to be answered in **OMR sheet**.

**Section – B**

**Section B** is of **50 Marks** with **TWO hours** time duration with the following type of **TWO** questions covering the whole syllabus in equal weightage, each of twenty five marks to be answered in the separate answer-book.

Question 1 and 2 will cover unit 1 and 2 respectively.

<b>Question no.</b>	(A) Answer any <b>three out of six</b>	6 Marks
	(B) Answer any <b>three out of six</b>	9 Marks
	(C) Answer any <b>two out of five</b>	10 Marks
	<b>TOTAL</b>	<b>25 MARKS</b>

**-: Project Work:-**

- There will be a project on any topic in Mathematics preferably not covered in the syllabus.
- The project will be assigned in the teams (groups) of at least three and at most five students.
- There will be one lecture per week to guide and motivate for each group of students.
- Topic of the project may be selected based on the following
  1. Demand of mathematics required to cater the need of industries and the society as a whole.
  2. New topic not taught up to final semester.
  3. The topic may be an extension of topic covered in any of the topics/subject taught up to sixth semester.
  4. Innovative teaching methodology of Mathematics may also be selected as a topic of the project work.
  5. Students may also construct innovative models based on mathematical concepts even those taught at secondary or higher secondary level.
  6. Every project or even model must be submitted with proper documentation about the concept and the model.
- **During the fifth semester students will be**
  1. Introduced and assigned title of the project,
  2. Teams will be formed for the same.
  3. Each group will study, search reference, collect data and work-out details for their topic of project-work.
- **During the sixth semester**
  1. Students will finalize, document, submit and get the project work certified in their names.
  2. The project work must be submitted by the student in the fourteenth week of the sixth semester.
  3. Only on the submission of project dissertation the student will be issued hall ticket for the end semester theory and practical examination.
  4. The dissertation must be typed and be limited to 50 to 70 pages of A4 size.
  5. Project work shall be evaluated by an external and one internal examiner which will be followed by presentation of the work and viva-voce.
  6. Students will be required to undergo verification, evaluation and viva of the project-work they have done.
  7. Certified documentation of the project-work done by each group is mandatory. The certified documentation should be produced while appearing for viva and evaluation of project during final examination of sixth semester.
- The project work will be evaluated for 100 marks of which **60% marks** will be allotted for the **dissertation** and **40% for the presentation** and **viva-voce**
- **The Evaluation of the project work will be done at the end of the sixth semester. For the Evaluation of the project work there shall be three hours duration at the end of the sixth semester. There shall be batch of 15 students for project and viva.**

**B.Sc. Mathematics**  
**SEMESTER - 5**  
**Mathematics PAPER BSMT – 501 (A) (Theory)**  
**Mathematical Analysis and Group Theory**

**Mathematical Analysis-1**

**UNIT 1:** **[25 MARKS]**

- [a] **Riemann Integral:**  
Partitions and Riemann sums, Upper and lower R-integrals, R-integrability, The integral as limit, Some classes of integrable functions, Properties of integrable function,
- [b] Continuity, Derivability of the integral functions, Fundamental theorem of integral calculus, Mean value theorem of integral calculus.
- [c] **Metric Spaces:** Definition and examples of metric space, neighborhood, limit points, interior points, Open and closed sets, Closure, derived set and interior, boundary points. Continuity in metric space, Convergence and completeness, Cauchy's sequence completeness, Dense sets, Cantor sets [**include Cantor set is closed**] but [**OMIT: - cantor set is compact and complete.**]

**Group Theory**

**UNIT 2:** **[25 MARKS]**

- [a] Definition of Binary Operation, Properties of B.O. & Examples, Group & its Properties, Examples Of Group, Subgroup & Its Properties, Cosets & Its Properties, Lagrange's theorem.
- [b] Permutation, Transposition, Even & Odd Permutation, Symmetric Group, Inverse of Permutation, Alternative Group & Its Universal Property.
- [c] Cyclic Group & Cyclic Subgroup & Its Properties, Deduction Of Lagrange's Theorem. Definition of Isomorphism, Equivalence Relation.
- [d] Cayley Theorem, Automorphism, Properties of isomorphism, Normal subgroup and quotient group.

**Text Book for MATHEMATICS PAPER BSMT - 501 Unit – 2 Group Theory**

**Abstract Algebra**

**By : Dr. I. H. Sheth,**

**Prentice Hall Of India,**

**New Delhi.**

**Course of Mathematics PAPER BSMT – 501 Group Theory**

is covered by following Chapters/ Sections of the above mentioned book namely Abstract Algebra

**Chapter 4:** § 4.1, § 4.2, § 4.3, § 4.4, §4.5 [OMIT: Example 4.1.11]

**Chapter 6:**

- § 6.1, § 6.2[OMIT: Example 6.2.7], § 6.3,
- [**Omit:-** § 6.4], § 6.5

[**Omit:-** Generalized associative law, Theorem: 6.5.2, Theorem: 6.5.3 ]

§ 6.6, § 6.7

**Chapter 7:** § 7.1, § 7.2, § 7.3

**Chapter 8:** § 8.1, § 8.2, § 8.3 [**Omit:-** Theorem: 8.2.2 ]

**Chapter 9:** § 9.1, § 9.2, § 9.3

**Chapter 10:** § 10.1, § 10.2

**Chapter 11**

- **Omit :-** Chapter 11 Cyclic Groups
- [The whole chapter is to be omitted]

**Chapter 12:**

- § 12.3, § 12.4 [**Omit:-** § 12.5 ]

[Remaining sections of this chapter will be covered in 6<sup>th</sup> semester ]

References: -

- (1) Topics in Algebra, 1. N. Herstein, Willey Eastern Ltd. New Delhi
- (2) A text Book of Modern Abstract Algebra, by Shantinakaran, S. Chand & Co., New Delhi.
- (3) Fundamentals of Abstract Algebra, D. S. Malik, J. N. Mordoson and M. K. Sen, McGraw Hill International Edition - 1997
- (4) University Algebra, M. S. Gopalakrishna, Wiley Eastern Ltd.
- (5) Abstract Algebra, By Bhattacharya, Yallo Publications.
- (6) Modern Algebra, By Kazi zamiudia & Sursit, Vikas Publication. Delhi.
- (7) Text Book: Abstract Algebra, Dr. 1. H. Sheth, Nirav Prakashan, Ahmedabad.
- (8) Mathematical Analysis (2nd edition) by S. C. Malik & Arora, New Age Inter. Pvt.'
- (9) Mathematical Analysis, by T. M. Apostol
- (10) Real Analysis, by R. R. Goldberg (Chapel' 4,5,6, 7,9 & 10.1)
- (11) A course of Mathematical Analysis, by Shantinakaran, S. Chand & Sons.
- (12) Metric space, by E. T. Capson
- (13) Metric space, P. K. Jain & Ahmad, Narora Publishing House
- (14) Real Analysis by Sharma and Vasishtha Krishna Prakashan, Meerut-2.
- (15) Mathematical Analysis, by Dr. Goyal and Gupta, Krishna Prakashan, Meerut-2.

**B.Sc. Mathematics**  
**SEMESTER -5**  
**MATHEMATICS PAPER BSMT-502(A)- (Theory)**  
**PROGRAMMING IN C and Numerical Analysis**

**PROGRAMMING IN C ( THEORY)**

**UNIT 1:**

**[25 Marks**

- [a] History of C, C character set, Constants, Variables, Keywords, Type Declaration, Type Conversion, Hierarchy of operators, printf & scanf functions, if statement, if-else statements, Nested if-else, Logical operators, Conditional operators,
- [b] While loop, for loop, do while loop, break statement, Continue statement goto statement, Introduction to User Defined Functions. **[Omit:- switch case statement, Pointers and Recursion]**
- [c] Data types in C Integers: long and short types, signed and unsigned characters, Signed and unsigned float and doubles, C processors, meaning , Only Macro Expansion, Macros with Arguments,  
**[OMIT:- File inclusion and various directives Conditional Compilation #if and #elif Directives Miscellaneous Directives #undef Directive #pragma Directive]**
- [d] Arrays, meaning: one dimensional and two dimensional, only initialization and use in simple programs **[OMIT:- no pointers and no three dimensional array, Arrays and functions.]**

**NUMERICAL ANALYSIS-1**

**UNIT 2**

**[25 MARKS]**

- [a] **Simultaneous linear algebraic equation:**  
Direct methods: Gauss elimination method, Gauss Jordan method, Method of factorization ( L.U. Decomposition), Crout's method. Iterative methods: Jacobi's method, Gauss Seidal's method.
- [b] **Empirical laws and curve fitting.**  
The linear law, Laws reducible to linear laws, Principle of least square, Fitting a straight line, a parabola and exponential curve and the curve  $y = ax^b$
- [c] **Finite differences,**  
Finite differences(forward , backward and central),  
Differences of polynomials, Factorial polynomial, Reciprocal Factorial polynomial , Polynomial factorial notation, Error propagation in difference table, Other difference operators(Shift, averaging, differential and unit ) and relation between them.
- [d] **Interpolation with equal intervals:**  
Gregory- Newton forward interpolation formula, Gregory- Newton backward interpolation formula, Equidistance terms with one or more missing values,

**Text Book for MATHEMATICS PAPER BSMT-502(A) (Theory)**

**PROGRAMMING IN C is as follows:**

**'LET US C' By : Yashvant Kanetker 5<sup>th</sup> Edition,  
BPB Publications, New Delhi.**



**Course of PROGRAMMING IN C (THEORY)**

i.e. **UNIT 1** is covered by following Sections / Chapters of the book “LET US C”

**Unit 1:-**

- **Chapter 1**  
Getting Started  
[Omit:- the section of Associativity of Operator]
- **Chapter 2**  
The decision control Structure [Whole chapter]
- **Chapter 3**  
The loop control Structure [Whole chapter]  
For the topic of “User Defined Functions” refer to  
**any other standard book**
- **Chapter 4**  
The case control Structure  
[Omit: - Switch –Case Statement and related sections]  
Only The goto keyword and its usage.
- **Chapter 5 :-**  
[Omit:- The whole Chapter 5 – namely “Functions and Pointers” of the book “LET US C” ]
- **Chapter 6:-**  
Data Types Revisited  
[Omit:- Storage Classes like Automatic Storage Class Register Storage Class, Static Storage Class ,  
External Storage Class, Which to Use When...etc.]
- **Chapter 7:-**  
The C Preprocessor  
Features of C Preprocessor, Macro Expansion, Macros with Arguments, Macros versus Functions  
[OMIT:- File Inclusion Conditional Compilation, #if and #elif Directives,  
Miscellaneous Directives,  
#undef Directive, #pragma Directive]
- **CHAPTER 8:-**  
Arrays. What are Arrays, A Simple Program Using Array, More on Arrays, Array Initialization, Bounds Checking, Passing Array Elements to a Function, Two Dimensional Arrays, Initializing a 2-Dimensional Array  
[OMIT:-Pointers and Arrays, Passing an Entire Array to a Function, The Real Thing, Memory Map of a 2-Dimensional Array, Pointers and 2-Dimensional Arrays, Pointer to an Array, Passing 2-D array to a Function, array of pointers, three dimensional array, summary.]

The scope of the syllabus of **UNIT 2** is roughly indicated as under:

**"Numerical methods"** by Dr. V. N. Vedamurthy & Dr. N. Ch. S. N. Iyengar, Vikas Publishing house.

Chap. 1. (Except 1.4,1.5,1.11,1.12), Chap. 4 (Except 4.4,4.7), Chap. 5. (Except 5.12), Chap. 6

**Reference Books: (for Unit 2)**

(1) Introduction to Numerical Analysis (2nd Edition) by C.E.Froberg Addison Wasley, 1979

(2) Numerical Mathematical Analysis, by J. B.Scarforough, Oxford & IBH Publi.Co. Pvt. Ltd., 1966

(3) Numerical method, Problems & Solutions, by M. K. Jain, S. R. K.Iyengar, R. K. Jain, New Age International Pvt. Ltd., 1996.

**B.Sc. Mathematics**  
**SEMESTER -5**  
**MATHEMATICS PAPER BSMT-503 (A)- (Theory)**  
**DISCRETE MATHEMATICS & COMPLEX ANALYSIS**

**DISCRETE MATHEMATICS**

**UNIT 1:** **[25 MARKS]**

[a] **Relations** and different types of relations. Binary relations, Equivalence relations and partitions, partial order relations, Posets, Hasse diagram, Lattices as posets, Properties of lattices, Lattices as algebraic systems, Sub lattices, Direct product of two lattices, Homomorphism, order isomorphism of two posets, Isomorphic lattices, Complete lattices, Distributive lattices, Complemented lattices.

[b] **Boolean algebra:**

Definition, Examples BA, Direct product of two BA, homomorphism, Atoms of BA, Anti atoms, Stone's representation theorem, The set  $A(x)$  of all atoms of BA and its properties. Isomorphism of a finite of finite BA and  $(P(A), \subseteq)$ , Boolean functions / expressions, Minterms, Maxterms, Representation of a B. expression as a sum of product Canonical form. Karnaugh map. Minimization of a B. expression by cube array representation and by Karnaugh map.

**COMPLEX ANALYSIS-I**

**UNIT 2:** **[25 MARKS]**

[a] **Analytic functions:**

Functions of complex variables, limits, Theorems on limits, Continuity and differentiability, of complex functions, harmonic functions, Entire functions and analytic functions, Cauchy Riemann conditions in Cartesian and polar form.

[b] Definite integral contours, line integrals Cauchy-Goursat theorem(**without proof**), Cauchy's integral formula, Higher order derivative of analytic function, Morera's theorem, Cauchy's inequality and Liouville's theorem, Fundamental theorem of algebra, Maximum modulus theorem.

**Text Book of Mathematics PAPER BSMT 503 (A) UNIT 2**  
**COMPLEX ANALYSIS-1**

**“ Complex Variables and Applications”**  
**Fifth Edition,**  
**Rul V. Churchill and James Ward Brown.**  
**Mc Graw Hill Publishing Company.**

**Chapter 2**

- Sections 9 to 21.

**Chapter 4**

- Sections 30 to 35.
- Sections 36 to 37.  
[Lemma and Cauchy-Goursat theorem (in sections) 36 **without proof**],
- Sections 39 to 43.

**References:**

- (1) Complex variables and applications, by R. V. Churchill and J. \ Brown
- (2) Theory of functions of a Complex variables, by Shantinakaran, Chand & Co.
- (3) Complex variables, Introduction and applications, by Mark Ablowitz and A. S. Fokas, Cambridge University Press.
- (4) Graph theory with application to engineering and computer science. by Narsingh Deo. 1993,Prentice Hall of India Pvt. Ltd.
- (5) Foundation of Discrete Mathematics, K. D. Joshi, New Age International Ltd. Publishers.
- (6) A first look at Graph theory, by Clark.
- (7) Discrete Mathematical Structures with applications to computer science, by Trembley 1.P. and Manohar R.
- (8) Elements of Discrete Mathematics (2nd edition) by L. Liu, Me. GrawHill, International edition, Computer Science series, 1986.
- (9) Discrete Mathematics, By Vatsa, Vikas Publications.
- (10) Introduction Graph Theory, By R. J. Willsons
- (11) Discrete Mathematics Structure, By. Dugragi, Narora Pub.

**B.Sc. Mathematics**  
**SEMESTER - 5**  
**Mathematics PAPER BSMT – 501 (B) (Practical)**  
**Numerical Analysis – I**

- **Total Marks:- 35 Marks (External) + 15 Marks (Internal) = 50 Marks / 3 hours**

Pr. No.(1)	Fitting (1) a straight line and (2) $y = e^{ax}$
Pr. No.(2)	Fitting (1) a parabola and (2) $y = ax^b$
Pr. No.(3)	Gauss elimination
Pr. No.(4)	Gauss Jordan method [OMIT : Triangularisation method and Crout's method.]
Pr. No.(5)	Jacobi's method
Pr. No.(6)	Gauss Seidel's method [OMIT: Relaxation method]
Pr. No.(7)	Finite differences.
Pr. No.(8)	Gregory-Newton's forward interpolation formula.
Pr. No.(9)	Gregory-Newton's backward interpolation formula.
Pr. No.(10)	Equidistance terms with one or more missing values

**Notes :**

- There shall be **SIX** periods of **1 hour** per week per batch of **15** students.
- **10** practical should be done during semester-3.
- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
- There shall be one question paper of **35 Marks** and **3 Hours** for practical examination
- There shall be **15 marks** for Internal Practical Examination  
(i.e. Continuous internal assessment of performance of each student during the practical work,)

**Format of Question Paper for Practical Examination**

Question 1	Answer any THREE out of FIVE	[ 9+9+9=	27 Marks
Question 2	Journal and Viva:	[	8 Marks
Question 3:	Internal Practical Examination	[	15 Marks
	<b>TOTAL</b>	[	<b>50 Marks</b>

**B.Sc. Mathematics**  
**SEMESTER - 5**  
**Mathematics PAPER BSMT – 502 (B) (Practical)**  
**Programming in C language**

- **Total Marks:- 35 Marks (External)+ 15 Marks (Internal) = 50 Marks / 3 hours**

Pr. No.(1)	To write a program to reverse a number,
Pr. No.(2)	To write a program to find sum of the digits,
Pr. No.(3)	To write a program to find prime number between two numbers,
Pr. No.(4)	To write a program to find nPr and nCr.
Pr. No.(5)	To write a program to print Armstrong numbers,
Pr. No.(6)	To write a program to generate arithmetic and geometric progressions.
Pr. No.(7)	To write a program to find compound interest for given years,
Pr. No.(8)	To write a program to find net salary of the employee.
Pr. No.(9)	To write a program to solve the quadratic equation,
Pr. No.(10)	To write a program to find number of odd number and even numbers.
Pr. No.(11)	To write a program to add and multiply two matrices.
Pr. No.(12)	To write a program to solve the equation by Bisection method or
Pr. No.(13)	To write a program to solve the equation by N-R method.
Pr. No.(14)	To write a program to verify a number whether it is palindrome or not.

**Notes :**

- There shall be **SIX** periods of **1 hour** per week per batch of **15** students.
- **10** practical should be done during semester-3.
- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
- There shall be one question paper of **35 Marks** and **3 Hours** for practical examination
- There shall be **15 marks** for Internal Practical Examination  
(i.e. Continuous internal assessment of performance of each student during the practical work.)

**Format of Question Paper for Practical Examination**

Question 1	Answer any THREE out of FIVE	[ 9+9+9=	27 Marks
Question 2	Journal and Viva:	[	8 Marks
Question 3:	Internal Practical Examination	[	15 Marks
	<b>TOTAL</b>	[	<b>50 Marks</b>

**B.Sc. Mathematics**  
**SEMESTER - 5**  
**Mathematics PAPER BSMT – 503 (B) (Practical)**  
**Programming with SCILAB**

- **Total Marks:- 35 Marks (External)+ 15 Marks (Internal)= 50 Marks / 3 hours**

- Pr. No.(1) To find the inverse of a matrix using **GAUSS-ELIMINATION** method..
- Pr. No.(2) To find inverse of given matrix using **GAUSS-JORDAN** method
- Pr. No.(3) To find **Eigen values** and **Eigen vectors** of given matrix
- Pr. No.(4) To find inverse of given matrix using **CAYLEY-HAMILTON** theorem
- Pr. No.(5) To solve given system of simultaneous linear algebraic equations using **GAUSS-JORDAN** method.
- Pr. No.(6) To solve given system of simultaneous linear algebraic equations using **GAUSS-JACOBI** method.
- Pr. No.(7) To solve given system of simultaneous linear algebraic equations using **GAUSS-SEIDAL'S** method.
- Pr. No.(8) To draw graphs of **Cycloid**
- Pr. No.(9) To draw graphs of **Catenaries**
- Pr. No.(10) To draw graphs of **spiral  $r = \exp(-\theta/10)$** .

**Notes :**

- There shall be **SIX** periods of **1 hour** per week per batch of **15** students.
- **10** practical should be done during semester-3.
- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
- There shall be one question paper of **35 Marks** and **3 Hours** for practical examination
- There shall be **15 marks** for Internal Practical Examination  
(i.e. Continuous internal assessment of performance of each student during the practical work.)

**Format of Question Paper for Practical Examination**

Question 1	Answer any THREE out of FIVE	[ 9+9+9=	27 Marks
Question 2	Journal and Viva:	[	8 Marks
Question 3:	Internal Practical Examination	[	15 Marks
	<b>TOTAL</b>	[	<b>50 Marks</b>

**Syllabus of B.Sc. Semester-6**  
**According to Choice Based Credit System**  
**Effective from June - 2012**

- **Program:** B.Sc.
- **Semester:** 6
- **Subject:** Mathematics
- **Course codes:** BSMT-601(A) -Theory  
BSMT-602(A) -Theory  
BSMT-603(A) -Theory  
BSMT-601(B) - Practical  
BSMT-602(B) - Practical  
BSMT-603(B) - Practical  
1 Project
- **Total Credit Of The Semester** 24 Credit

**B. Sc. MATHEMATICS SEMESTER : VI**

- The Course Design of B. Sc. Sem.- VI (Mathematics) according to choice based credit system (CBCS) comprising of Paper Number, Name, No. of theory lectures per week, No. of practical lectures per week, total marks of the course are as follows :

SR.NO	SUBJECT	NO. OF THEORY LECTURE PER WEEK	NO. OF PRACTICAL LECTURE PER WEEK	TOTAL MARKS	Credit Of Each Paper.
1	<b>PAPER BSMT-601 (A)</b> (Theory) <b>Graph Theory &amp; Complex Analysis-2</b>	6	-	70(External)+ 30 (Internal) = 100 Marks	4
2	<b>PAPER BSMT-602 (A)</b> (Theory) <b>Analysis-2 &amp; Abstract Algebra-2</b>	6	-	70(External)+ 30 (Internal) = 100 Marks	4
3	<b>PAPER BSMT-603 (A)</b> (Theory) <b>Optimization &amp; Numerical Analysis-II</b>	6	-	70(External)+ 30 (Internal) = 100 Marks	4
4	<b>PAPER BSMT-601 (B)</b> (Practical) <b>Introduction to SAGE</b>	-	3	35(External)+ 15(Internal) = 50 Marks	3
5	<b>PAPER BSMT-602 (B)</b> (Practical) <b>Numerical Analysis-II</b>	-	3	35(External)+ 15(Internal) = 50 Marks	3
6	<b>PAPER BSMT-603 (B)</b> (Practical) <b>Optimization</b>	-	3	35(External)+ 15(Internal) = 50 Marks	3
7	<b>Project Work &amp; Viva</b>	1 Guidance Lect. For a group of 2 to 5 students / week	Project work to be finalized and certified and evaluated.	<b>60Marks</b> <b>(Dissertation) +</b> <b>40 Marks</b> <b>( Viva ) =</b> <b>100 Marks</b>	3
<b>Total credit of the semester five</b>					<b>24</b>



**Marks Distribution Of Each Paper  
for  
Theory and Practical ( for SEMESTER-VI )**

- **Total Marks of Each Theory Paper [External Examination]**      **20 Marks (MCQ test)+  
50 Marks (Descri. type)=  
70 Total Marks.**
- **Total Marks of Each Theory Paper [Internal Examination]**      **10 Marks Assignments +  
10 Marks QUIZ test +  
10 Internal exam. =  
30 Total Marks**
- **Total Marks of Each Practical Paper [External Examination]**      **35 Marks**
- **Total Marks of Each Practical Paper [Internal Examination]**      **15 Marks  
[Continuous internal assessment of  
practical work ]**

**Format of Question Paper**

- There shall be one question paper of **70 marks & 3 hours** for each Mathematics **Theory Paper**.
- There shall be **TWO** sections in this paper i.e. **Section A** and **Section B**.

**Section – A**

**Section A is of 20 Marks** with **one hour** time duration with **20 MCQ** type questions (multiple choice questions) covering the whole syllabus in equal weightage to be answered in **OMR sheet**.

**Section – B**

**Section B is of 50 Marks** with **TWO hours** time duration with the following type of **TWO** questions covering the whole syllabus in equal weightage, each of twenty five marks to be answered in the **separate answer-book**.

**Question 1 and 2** will cover unit 1 and 2 respectively.

<b>Question no.</b>	(A)	Answer any <b>three out of six</b>	6 Marks
	(B)	Answer any <b>three out of six</b>	9 Marks
	(C)	Answer any <b>two out of five</b>	10 Marks
	<b>TOTAL</b>		<b>25 MARKS</b>

B.Sc. Mathematics  
SEMESTER - 6  
MATHEMATICS PAPER BSMT – 601 (A) (Theory)  
GRAPH THEORY and COMPLEX ANALYSIS

GRAPH THEORY

UNIT 1: [25 MARKS]

[a] Graph theory:

Basic definitions and simple examples, Directed, Undirected, multi-graph, mixed graph. Incidence relation and degree of the graph. Empty, complete, regular graphs. Sub graph, connected and disconnected graphs.

Walk and unilateral components, Euler graphs, Unicursal graph, Operation of graph circuit & tree. Hamiltonian path and cycles, tree, Binary and Spanning trees.

[b] Cut-set, connectivity and separability

[OMIT:-1-isomorphism, 2-isomorphism]

planner graphs and their different representation, Dual of a planner graph, Euler's formula, Kuratowski's first and second non-planner graph, vector space associated with a graph, Circuit subspace and cut sets subspace, Orthogonal space.

Vertex coloring, Chromatic number, Index number and partition, Cyclic graph and demyelization of cyclic graphs, Matrix representation of a graph, Adjacency matrix, Incidence matrix, Path matrix,

[OMIT :- Circuit matrix, Fundamental circuit matrix and cut set matrix, Relation ship of these matrices]

Rank of the adjacency matrix.

COMPLEX ANALYSIS-2

UNIT 2: [25 MARKS]

[a] Power series:

Definition of complex sequence, Complex series and power series Expansion of a complex function in Taylor's series and Laurent's series.

Mapping and Conformal mapping:

Elementary functions, mapping by elementary functions, Mobious mapping, linear function

Bilinear mapping  $w=(az+b)/(cz+d)$ ,  $w = z^2$ ,  $w = \frac{1}{z}$ ,

$w = \exp(z)$ ,

[OMIT:  $w = \sin z$ ,  $w = \cos z$ ,  $w = \cosh z$ ,  $w = \sinh z$

Transformations, Conformal mappings and their examples.]

[b] Residues and poles:

Definition of a singular point, Isolated singular points, Zeros of complex functions, Poles and residues of complex function, Cauchy's residue's theorem, Evaluation of improper real integrals by residue theorem and evolution of definite integral of trigonometric functions by residue theorem.

**Text book for Mathematics PAPER BSMT – 601**

**Graph theory**

**Graph theory with application to engineering and computer science**

**By: - Narsingh Deo,**

**Prentice Hall of India Private Limited, New Delhi.**

**Chapter: 1**

- § 1.1, § 1.3, § 1.4, § 1.5
- [OMIT :- § 1.2 and § 1.6]

**Chapter: 2**

- § 2.1, § 2.2, § 2.3, § 2.4, § 2.5, § 2.6, § 2.7, § 2.8, § 2.9
- [OMIT: - § 2.10]

**Chapter: 3**

- § 3.1, § 3.2, § 3.3, § 3.5, § 3.6, § 3.7, § 3.8
- [OMIT: - § 3.4, § 3.9, § 3.10]

**Chapter: 4**

- § 4.1, § 4.2, § 4.3, § 4.4, § 4.5,
- [OMIT: - § 4.6, § 4.7, § 4.8 ]

**Chapter: 5**

- § 5.2, § 5.3, § 5.4, § 5.5, § 5.6
- [OMIT: - § 5.1, § 5.7, § 5.8, § 5.9]

**Chapter: 6**

- § 6.1, § 6.5, § 6.7, § 6.9
- [OMIT: - § 6.2, § 6.3, § 6.4, § 6.8]

**Chapter: 7**

- § 7.1, § 7.8, § 7.9
- [OMIT: - § 7.2, § 7.3, § 7.4, § 7.5, § 7.6, § 7.7]

**Chapter: 8**

- § 8.1, § 8.2, § 8.5
- [OMIT: - § 8.3, § 8.4, § 8.6]

**Chapter: 9**

- § 9.1, § 9.11
- [OMIT: - § 9.2 to § 9.10]

**Text Book of Mathematics PAPER BSMT 601**  
**COMPLEX ANALYSIS-2**

**“Complex Variables and Applications”**  
**Fifth Edition,**  
**Ruel V. Churchill and James Ward Brown.**  
**Mc Graw – Hill Publishing Company**

**Chapter 5**

- Sections 44, 45, 46, 47, 48 [Omit Sections: -49, 50, 51],

**Chapter 6**

- Sections 53 to 58, 60 [OMIT:- Sections 59]

**Chapter 7**

- Sections 64, 65, 66, 67, 68, 70  
[OMIT Sections: - 63, 71, 72]  
[OMIT: - Chapter 8]

**References:**

- (1) Complex variables and applications, by R. V. Churchill and J. \ Brown
- (2) Theory of functions of a Complex variables, by Shantinarayan, Chand & Co.
- (3) Complex variables, Introduction and applications, by Mark Ablowitz and A. S. Fokas, Cambridge University Press.
- (4) Graph theory with application to engineering and computer science.by Narsingh Deo. 1993,Prentice Hall of India Pvt. Ltd.
- (5) Foundation of Discrete Mathematics, K. D. Joshi, New Age International Ltd. Publishers.
- (6) A first look at Graph theory, by Clark.
- (7) Discrete Mathematical Structures with applications to computer science, by Trembley 1.P. and Manohar R.
- (8) Elements of Discrete Mathematics (2nd edition) by L. Liu, Me. GrawHill, International edition, Computer Science series, 1986.
- (9) Discrete Mathematics, By Vatsa, Vikas Publications.
- (10) Introduction Graph Theory, By R. J. Willsons
- (11) Discrete Mathematics Structure, By. Dugragi, N

B.Sc. Mathematics  
SEMESTER - 6  
MATHEMATICS PAPER BSMT – 602 (A) (Theory)

ANALYSIS and ABSTRACT ALGEBRA

ANALYSIS-2

**UNIT 1:** [25 MARKS]

- [a] Cover, Open cover, Finite sub cover, Compact set, Properties of compact sets  
**Connected sets, Separated sets, Bolzano-Weirstrass theorem, Countable set.**
- [b] Continuity and uniform continuity, homeomorphism of two metrics, Sequential compactness, totally bounded space.
- [c] **Laplace Transforms**  
Definition of Laplace Transforms, Laplace Transforms of elementary Function  
Inverse Laplace Transforms, Laplace Transforms of Derivative and Integrals,  
Laplace Transforms Differentiation and integration of Laplace Transforms,  
Convolution theorem. [Omit: - Application to Differential Equations.]

ABSTRACT ALGEBRA-2

**UNIT 2:** [25 MARKS]

- [a] Homomorphism, Kernel of homomorphism, Fundamental theorem of homomorphism. Ring and its properties, Subring, [OMIT:- Boolean ring, Euclidean ring]
- [b] Field, Zero divisor, Integral domain, Characteristics of ring, Cancellation law, Ideals, Principal ideal, Polynomial ring, [OMIT:- Quotient ring. Maximal ideal] Polynomial, Degree of polynomial, Factor and remainder theorem of polynomial, Product, sum and division of polynomials.
- [c] Reducible and irreducible polynomials, Factorization of polynomials( unique Factorization theorem **(without proof)**, [OMIT:- Eisenstein's criterion] Division algorithm theorem of polynomial
- [d] G.C.D. of polynomials, Quaternion [OMIT:- Ring homomorphism, Euler and Fermat's theorem]

Text book for Mathematics PAPER BSMT – 602

ANALYSIS-2

For Laplace Transforms

'Advanced Mathematics for Pharmacy' By: - Mahajan Publishing House, Ahmedabad

Chapter: - 17 Laplace Transforms

§ 17.1, § 17.2, § 17.3, § 17.4, § 17.5, § 17.6

[OMIT :- Application to Differential Equations]

**Text Book for MATHEMATICS PAPER BSMT-602(A)**

**“Abstract Algebra” By: Dr. I. H. Sheth, Prentice Hall Of India, New Delhi.**

**Course of Mathematics PAPER BSMT – 602 (Abstract Algebra-2)** are covered by following Chapters/ Sections of the above mentioned book Abstract Algebra

**Chapter 12:** § 12.1, § 12.2, § 12.6  
**Chapter 13:** § 13.1, § 13.2, § 13.3, § 13.4  
**Chapter 14:** § 14.1, § 14.2, § 14.3, § 14.4  
**Chapter 15:** § 15.1, § 15.2, § 15.4 [OMIT:- § 15.3]  
**Chapter 18:** § 18.1, § 18.2, § 18.3,  
§ 18.4 [Omit: Theorem: 18.4.8  
i. e. unique Factorization theorem **(without proof)**],  
§ 18.5[OMIT: - § 18.6 - Eisenstein’s criterion ]  
§ 18.7.

**References :**

- (1) Topics in Algebra, I. N. Herstein, Willey Eastern Ltd. New Delhi
- (2) A text Book of Modern Abstract Algebra, by Shantinarayan, S. Chand & Co., New Delhi.
- (3) Fundamentals of Abstract Algebra, D. S. Malik, J. N. Mordoson  
and M. K. Sen, McGraw Hill International Edition - 1997
- (4) University Algebra, M. S. Gopalakrishna, Wiley Eastern Ltd.
- (5) Abstract Algebra, By Bhattacharya, Yallo Publications.
- (6) Modern Algea, By Kazi zamiudia & Sursit, Vikas Publication. Delhi.
- (7) Text Book: Abstract Algebra, Dr. I. H. Sheth, Nirav Prakashan, Ahmedabad.
- (8) Mathematical Analysis (2nd edition) by S. C. Malik & Arora, New Age Inter. Pvt.'
- (9) Mathematical Analysis, by T. M. Apostol
- (10) Real Analysis, by R. R. Goldberg (Chapel' 4,5,6, 7,9 & 10.1)
- (11) A course of Mathematical Analysis, by Shantinarayan, S. Chand & Sons.
- (12) Metric space, by E. T. Capson
- (13) Metric space, P. K. Jain & Ahmad, Narora Publishing House
- (14) Real Analysis by Sharma and Vasishtha Krishna Prakashan, Meerut-2.
- (15) Mathematical Analysis, by Dr. Goyal and Gupta, Krishna Prakashan, Meerut-2.

B.Sc. Mathematics

SEMESTER - 6

MATHEMATICS PAPER BSMT – 603 (A) (Theory)  
OPTIMIZATION and NUMERICAL ANALYSIS

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OPTIMIZATION

**UNIT 1:** [25 MARKS]

- [a] The linear programming problems, Formulation of LPP, Matrix form of the LPP, general form, Canonical form, Standard form of the LPP, Graphical method to solve LPP, Some definitions and basic properties of convex sets convex functions and concave function. Basic definitions to use Simplex method, Simplex method, Big-M method (Penalty method), Two phase method to solve LPP( without alternative solution and unbounded solution)
- [b] Principle of duality in LPP, Primal LPP and method to find its dual LPP (Simple problems of above articles). The transportation problems: Mathematical and matrix form of TP. Initial solution of TP by NWCM, LCM and VAM, Optimum solution of TP by Modi method ( u-v method ) (except degenerate solution), Balanced and unbalanced TP(Simple problem ), Assignment problem: Mathematical and matrix form of AP, Hungarian method to solve method(simple method).

NUMERICAL ANALYSIS -2

**UNIT 2:** [25 MARKS]

- [a] **Central difference interpolation formulae:**  
Gauss's forward, Gauss's backward, Sterling's, Bessel's and Laplace- Everett's interpolation formulae.
- [b] **Interpolation with unequal intervals:**  
Divided differences, Properties of divided difference, Relation between divided differences and forward difference, Newton's divided difference formula, Lagrange's interpolation formula, Inverse interpolation, Lagrange's inverse interpolation formula,
- [c] **Numerical Differentiation:**  
Numerical Differentiation, Derivatives using Gregory-Newton's forward difference formula, Derivatives using Gregory-Newton's backward difference formula, Derivative using Sterling's formula.
- [d] **Numerical Integration:**  
Numerical Integration, General quadrature formula, Trapezoidal rule, Simpson 's 1/3 rule, Simpson's 3/8 rule.
- [e] **Numerical solution of ordinary differential equations**  
Solution by Taylor's series method, Taylor's series method for simultaneous first order differential equations, Picard's method, Picard's method for simultaneous first order differential equations, Euler's method, Improved Euler's method, Modified Euler's method.
- [f] Runge's method, Runge-Kutta methods, Higher order Runge-Kutta methods, Runge-Kutta methods for simultaneous first order differential equations, R-K methods for simultaneous first order differential equations, Predictor-Connector methods, Milne's method.

**Text Book for Mathematics PAPER BSMT – 603(A) (Theory)**

**OPTIMIZATION**

**Operation Research Theory and Applications’,  
J. K. Sharma, Second Edition,  
MACMILLAN INDIA LTD**

**Course of Mathematics PAPER BSMT – 603(A) OPTIMIZATION**  
is covered by following Chapters/ Sections of the above mentioned book

**Chapter 2:-**

- § 2.6 [Only]

**Chapter 3:-**

- § 3.1, § 3.2, § 3.3 [Omit:- § 3.4]

**Chapter 4**

- § 4.1, § 4.2, § 4.3, § 4.4 [Omit:- § 4.5 and § 4.6]

**Chapter 5**

- § 5.1, § 5.2, § 5.3 [Omit:- § 5.4, § 5.5 ]

**Chapter 9**

- § 9.1 to § 9.5 § 9.6
- [Only § 9.6.1 Unbalanced Supply and Demand]
- [Omit: - § 9.6.2, § 9.6.3, § 9.6.4... etc in § 9.6]
- [Omit: - § 9.7, § 9.8]

**Chapter 10** § 10.1 to § 10.3

- Appendix A A.10 and A.12
- [Omit: - § 10.4 to § 10.6]
- [Omit: - the rest]

The scope of the syllabus of **UNIT – 2** is roughly indicated as under:

"Numerical methods" by Dr. V. . Vedamurthy & Dr. N. Ch. S. N. Iyengar, Vikas Publishing house.

Chap.7 (Except 7.7,7.8), Chap. 8. (Except 8.8), Chap. 9. (Except 9.5, 9.13), Chap. 11. (Except 11.1, 11.2,11.3, 11.6, 11.9, 11.17, 11.20)

**Reference Books:**

- (1) Introduction to Numerical Analysis (2nd Edition) by C.E.Froberg Addison Wasley, 1979
- (2) Numerical Mathematical Analysis, by J. B.Scarforough, Oxford & IBH Publi.Co. Pvt. Ltd., 1966
- (3) Numerical method, Problems & Solutions, by M. K. Jain, S. R. K.Iyengar, R. K. Jain, New Age International Pvt. Ltd., 1996



**B.Sc. Mathematics**  
**SEMESTER -6**  
**MATHEMATICS PAPER BSMT – 601(B) (PRACTICAL)**  
**Introduction to SAGE**

**Pr no: (1) Introduction to Sage:**

i.e. Introduction to variables, constants, data types, some inbuilt (library) constants & functions, how to enter a matrix, how to enter a vector, operators, how to get help etc.

**Pr no: (2) Operations on expressions:**

- (a) Solve( $f(x)=g(x)$ ), $x$ )
- (b) Solve( $[f(x,y)=0,g(x,y)=0]$ ), $x,y$ )
- (c) Find a root of  $f(x)$  in the given interval  $[a, b]$  such that  $f(x) \approx 0$  (approximate root)
- (d) Finding sum and product of the given series from 1 to  $n$  terms.(using  $\text{sum}()$  and  $\text{prod}()$  functions)

**Pr no: (3) Calculus :**

- (a) Find limit of a given function.
- (b) Find left and right hand side limits of a given function.
- (c) Find derivative of a given function.
- (d) Finding maxima and minima of a given function  $f(x)$  in the given interval  $(a, b)$ .
- (e) Find partial derivative of a given bi-variate function.
- (f) Find indefinite integral of a given function.
- (g) Find definite integral of a given function.
- (h) Find numerical integral of a given function.
- (i) Find Taylor series expansion of a given function  $f(x)$  about  $x=a$  upto degree  $n$ .

**Pr no: (4) 2D Graphics :**

- (a) Draw a line passing through the given points.
- (b) Draw a polygon having the given points as its vertices.
- (c) Draw a circle with the given point as center and with the given radius.
- (d) Plotting the graph of a given function  $f(x)$ .
- (e) Draw the graph of the function. (given in parametric form)
- (f) Drawing graph of the function.( in polar form)
- (g) Drawing combine graphs.
- (h) Drawing graphs with animation.
- (i) Using options in plotting of 2D graphs.

**Pr no: (5) 3D Graphics :**

- (a) Drawing a line in three dimension.
- (b) Draw a sphere with the given point as center and with the given radius.
- (c) Drawing Platonic solids ( tetrahedron,cube,octahedron,dodecahedron,icosahedrons)
- (d) Draw the graph of given function  $f(x,y)$  in 3D.
- (e) Draw the graph of given function  $f(x,y)$  in 3D.(parametric form)
- (f) Using options in plotting of 3D graphs.

**Pr no: (6) Simplification and expansion of a given symbolic function.**

**Pr no: (7) Finding partial fractions of a given function  $f(x)$ .**

**Pr no: (8) Linear Algebra:**

- (a) Entering  $m \times n$  matrix and finding its determinant .
- (b) Finding transpose, adjoint and conjugate of a given matrix.
- (c) To determine whether the entered matrix is square, zero, identity, scalar, symmetric, invertible , nilpotent, idempotent or not.
- (d) Entering a square matrix and finding its inverse if exists.
- (e) Finding rank, nullity no. of rows, no. of columns, trace, transpose of a given matrix.
- (f) Finding Echelon form of the entered matrix.
- (g) Finding characteristic polynomial, eigen values and eigen vectors of the entered matrix.
- (h) Performing row operations on the entered matrix.

**Pr no: (9) Number Theory:**

- (a) Determine the entered number is a prime or not.
- (b) Find the next prime ,previous prime next probable prime to the entered number.
- (c) Finding primes  $p$  such that  $m \leq p < n$ . (using `prime_range(m,n)`)
- (d) Finding prime powers ( using `prime_powers(m,n)`).
- (e) Finding continued fractions of  $x$ .

**Pr no: (10) Group Theory and Graph Theory:**

- (a) Permutation group, Symmetric group and Alternating group of  $n$  symbols.
- (b) Abelian group, Matrix groups ( $GL$ =General Linear group and  $SL$ =Special Linear group), normal subgroups.
- (c) Drawing graphs with given vertices and edges.
- (d) Chromatic polynomial of graph  $G$ .
- (e) Testing planarity of graph.
- (f) Finding Shortest Path in a graph  $G$ .

**Notes :**

- There shall be **SIX** periods of **1 hour** per week per batch of **15** students.
- **10** practical should be done during semester-3.
- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
- There shall be one question paper of **35 Marks** and **3 Hours** for practical examination
- There shall be **15 marks** for Internal Practical Examination (i.e. Continuous internal assessment of performance of each student during the practical work.)

**Format of Question Paper for Practical Examination**

Question 1	Answer any THREE out of FIVE	[ 9+9+9=	27 Marks
Question 2	Journal and Viva:	[	8 Marks
Question 3:	Internal Practical Examination	[	15 Marks
<b>TOTAL</b>		[	<b>50 Marks</b>

**B.Sc. Mathematics**  
**SEMESTER -6**  
**MATHEMATICS PAPER BSMT – 602(B) (PRACTICAL)**  
**NUMERICAL ANALYSIS – II**

- Pr. No.(1) Gauss forward interpolation formula.  
Pr. No.(2) Gauss backward interpolation formula.  
Pr. No.(3) Sterling's or Bessel's formula  
Pr. No.(4) Laplace-Everett's formula  
Pr. No.(5) Interpolation with unequal intervals.  
Pr. No.(6) Numerical differentiation.  
Pr. No.(7) Numerical integration.  
Pr. No.(8) Taylor's or Picard's  
Pr. No.(9) Euler's method.  
Pr. No.(10) Runge's method  
Pr. No.(11) Runge-Kutta's method  
Pr. No.(12) Milne's method

Journal and viva.

**Notes :**

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- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
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(i.e. Continuous internal assessment of performance of each student during the practical work.)

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	<b>TOTAL</b>	[	<b>50 Marks</b>

**B.Sc. Mathematics**  
**SEMESTER -6**  
**MATHEMATICS PAPER BSMT – 603(B) (PRACTICAL)**  
**OPTIMIZATION**

- Pr. No.(1) Solve the given LPP using Graphical method.  
Pr. No.(2) Solve the given LPP using Simplex method.  
Pr. No.(3) Solve the given LPP using BIG -M method.  
Pr. No.(4) Solve the given LPP using TWO-PHASE method.  
Pr. No.(5) Obtain DUAL of the given Primal LPP;  
Pr. No.(6) Find the initial solution of given transportation problem using NWCM method.  
Pr. No.(7) Find the optimum solution of given transportation problem using LCM method.  
Pr. No.(8) Find the optimum solution of given transportation problem using VAM method.  
Pr. No.(9) Find the optimum solution of given transportation problem using MODI method.  
Pr. No.(10) Find the optimum solution of given assignment problem.  
Journal and viva.

**Notes :**

- There shall be **SIX** periods of **1 hour** per week per batch of **15** students.
- **10** practical should be done during semester-3.
- At the time of examination candidate must bring his/her own practical journal duly certified and signed by **H.O.D.**
- There shall be one question paper of **35 Marks** and **3 Hours** for practical examination
- There shall be **15 marks** for Internal Practical Examination  
(i.e. Continuous internal assessment of performance of each student during the practical work.)

**Format of Question Paper for Practical Examination**

Question 1	Answer any THREE out of FIVE	[ 9+9+9=	27 Marks
Question 2	Journal and Viva;	[	8 Marks
Question 3:	Internal Practical Examination	[	15 Marks
	<b>TOTAL</b>	[	<b>50 Marks</b>