

PUNJABI UNIVERSITY, PATIALA

OUTLINES OF TESTS,  
SYLLABI AND COURSES OF READING  
FOR

B.Sc. (Computer Science, Statistics, Mathematics) Part -III

2023-24, 2024-25

Programme Code - STAB3PUP



PUNJABI UNIVERSITY, PATIALA  
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*Mr. Gupta*

*Dr. Singh*

*Dr. Singh*



## SYLLABUS

B.Sc. (Computer Science, Statistics and Mathematics) Part – III  
Outlines of Text Syllabi and Courses of Reading.

Note:-Every theory paper will be of three hours duration.

For Examination of Session **2023-24, 2024-25**

### 5<sup>th</sup> Semester

Code	Core/ Elective	Title of paper /subject	Hrs./ Week	Max. Marks		Total	Total Credits
				Cont. Asmt.	Uni. Exam.		
STAB3501T	Core	Communication Skills	2	20	30	50	3
STAB3502T	Core	Abstract Algebra	4	30	45	75	4
STAB3503T	Core	Discrete Mathematics	4	30	45	75	4
STAB3504T	Core	Computer Oriented Numerical Methods	3	20	30	50	3
STAB3505T	Core	Sample Surveys	3	20	30	50	3
STAB3506P	Core	Statistical Practicals-V	4	-	50	50	2
STAB3507T	Elective	Computer Networks and Data Communication	3	20	30	50	3
STAB3508T	Elective	Visual Programming	3	20	30	50	3
STAB3509P	Elective	Computer Practicals- V	4	-	50	50	2
			Total	160	340	500	27

**Note:** The minimum pass marks in each paper is 35% in Continuous Assessment and University Examination.



**BREAK-UP OF CONTINUOUS ASSESSMENT MARKS THEORY  
PAPERS**

- |   |  |
|---|--|
| 1. Two house/midterm tests will be held and their average will be considered for assessment | 50% Marks                                  |
| 2. Seminars/Assignments/Quizzes/Class participation   | 25% Marks                                  |
| 3. Attendance   | 25% Marks                                  |
| Marks will be given according to below criteria:  |  |
| 75% attendance & above but less than 80%  | 60% Marks of allotted marks to attendance  |
| 80% attendance & above but less than 85%  | 80% Marks of allotted marks to attendance  |
| 85% attendance & above  | 100% Marks of allotted marks to attendance |

*Ant*      *Rahul*      *of Jay*      *Chips*

## STAB3501T: COMMUNICATION SKILLS

<b>Duration of Lectures to be delivered :</b> 30 Hours	<b>Max. Marks :</b> 50	Uni. Examination - 30
		Int. Assessment - 20
<b>Time Allowed :</b> 3 Hours	<b>Min.Pass Marks :</b>	Uni. Examination - 35%
		Int. Assessment - 35%

### Course Objectives:

1. This course makes students understand and apply their knowledge of
2. language and communication in their practical life. Following are some objectives of this course:
3. To improve students' communication skills.
4. To improve their reading skills through various reading activities.
5. To make their writing style effective through the use of homonyms, one word substitution etc.
6. substitution etc.
7. To make them efficient in business correspondence.

### Course Learning Outcome:

1. Students became more confident by applying their knowledge of communication skills in their practical life, be it the interpersonal, intrapersonal or intercultural communication. They are able to write different types of business letters effectively.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having six parts of short-answer type covering the entire syllabus uniformly. All the questions will carry equal marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions will carry equal marks.

### SECTION –A

Communication: Process of communication. Types and channels of communications.

Reading Skills: Reading purpose, strategies and methodologies, Reading activities and structure of reading techniques

### SECTION –B

Writing Skills: Elements of effective writing, writing styles, use of homonyms, cloze tests, one word substitutions, abbreviations, Minutes of Meetings (MOM) etc.

Business Correspondence: Elements & kinds of business letters: office order, purchase order, quotations & tenders, Invoice etc.

### RECOMMENDED READINGS

1. N Sundarajan, Business Communication, Sura College of Competition, Chennai
2. Asha Kaul, Business Communication, Prentice Hall of India, New Delhi

3. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill Publishing Co., New Delhi
4. M V Rodriques, Effective Business Communication, Concept Publishing Company, New Delhi

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## STAB3502T: ABSTRACT ALGEBRA

<b>Duration of Lectures to be delivered :</b> 55 Hours	<b>Max. Marks :</b> 75	Uni. Examination - 40
		Int. Assessment - 30
<b>Time Allowed :</b> 3 Hours	<b>Min. Pass Marks :</b>	Uni. Examination - 35%
		Int. Assessment - 35%

### Course Objectives

The objective of the course is to introduce the fundamental theory of groups, rings and their homomorphisms.

### Course Learning Outcomes

1. Recognize the mathematical objects that are groups, and classify them as abelian, cyclic and permutation groups, etc.
2. Link the fundamental concepts of groups and symmetrical figures.
3. Analyze the subgroups of cyclic groups and classify subgroups of cyclic groups.
4. Explain the significance of the notion of cosets, normal subgroups and factor groups.
5. Learn about the fundamental concept of rings, integral domains and fields.
6. Know about ring homomorphisms and isomorphisms theorems of rings

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION-A

**Group Theory:** Semi-groups and groups. Examples: Integers modulo  $n$  under addition and under multiplication. Linear groups and finite Direct product of groups. Homomorphisms, subgroups and cosets. Euler-Fermat theorem. Poincares theorem. Cyclic Groups. Permutation groups. Cayley's thorem. Groups of symmetries. Normal subgroups and Quotient groups Isomorphism theorems, Automorphisms, Conjugacy and conjugate classes.

### SECTION- B

**Ring theory:** Definition and examples, the ring of integers modulo  $n$ . Elementary properties of rings. Types of rings, Integral domains division rings and fields. The ring of matrices, the ring of polynomials, ring of endomorphisms of abelian group. Subring and characteristic of ring. Ideals, the Quotient ring of a ring by an ideal, principal ideals examples. Homomorphism, the fundamental theorem and the correspondence theorem. The opposite of a ring. Unique factorization domains, principle ideal domains, Euclidean domains, polynomial rings over UFD, Gauss lemma. The ring  $R[x]$  as a UFD.

### TEXT BOOKS

1. Bhattacharya, P.B. and Jain, S.K., Nagpaul S.R. :Basic Abstract Algebra Chapters 4.



5, 9, 10 (Section 1 and 2 only) and Chapter 11. (2<sup>nd</sup> Edition) (2003)  
Cambridge University Press

**RECOMMENDED READINGS**

1. Herstein, I.N: Topics in Algebra.(2<sup>nd</sup> Edition) (2006), Wiley India Pvt. Ltd

*Handwritten signatures in blue ink:*  
A large signature on the left, possibly "Jay".  
A signature in the middle, possibly "Arsh".  
A signature on the right, possibly "Ravi".  
A signature below the middle one, possibly "Arsh".

## STAB3503T: DISCRETE MATHEMATICS

Duration of Lectures to be delivered : 55 Hours	Max. Marks :75	Uni. Examination - 40 Int. Assessment - 30
Time Allowed : 3 Hours	Min.Pass Marks :	Uni. Examination - 35% Int. Assessment - 35%

### Course Objective

Our course objective is to provide students an overview of discrete mathematics. In this course students will learn about topics such as

- Relation and Functions
- Sets
- Graph theory
- Logic and proofs
- Boolean algebra
- Recurrence relations
- Lattices
- Traveling salesman problems and other important concepts related to discrete mathematics.

### Course Learning Outcomes

*After the completion of course students will be able to:*

1. Prove basic sets equalities
2. Solve problems related to traveling salesmen.
3. Solve real world problems using graphs and trees.
4. Apply mathematical logic to solve problems.
5. Analyses some digital networks and switching circuits.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

Use of scientific non-programmable calculator is allowed.

#### SECTION-A

Sets and Propositions-Cardinality, Mathematical Induction, Principle of Inclusion and exclusion, Relations and Function- Binary relations, Equivalence relations and Partitions, Partial order relations and Lattices, Chains and Anti chains, Pigeon-Hole Principle.

Graphs and Planar Graphs – Basic Terminology, Multigraphs, Weighted Graphs, Paths and Circuits, Shortest paths, Eulerian paths and circuits, Traveling Salesman Problem, Planar Graphs, Discrete numeric functions and Generating functions.

#### SECTION-B

Recurrence Relations and Recursive Algorithms- Linear Recurrence Relations with Constant Coefficients, Homogeneous Solutions, Particular Solution, Total Solution, Solution by the Methods of Generating Functions.

Boolean Algebras – Lattices and Algebraic Structures, Duality, Distributive and Complemented

Lattices. Boolean Lattices and Boolean Algebras. Boolean Functions and Expressions. Propositional Calculus. Design and Implementation of Digital Networks. Switching Circuits.

#### TEXT BOOKS

1. Liu, C.L. & Mohapatra, D., Elements of Discrete mathematics : A Computer Oriented approach( 4th Edition ) (2017). McGraw Hill Education
2. Lipschutz, S., Lipson, M. L. & Patil, V. H. :Discrete Mathematics, Schaum's Outline Series (Revised 3<sup>rd</sup> Edition)(2017) McGraw Hill Education.

#### RECOMMENDED READINGS

1. Kenneth. H.Rosen: Discrete Mathematics and its Applications. (7<sup>th</sup> Edition), 2018 McGraw Hill Education.

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## STAB3504T: COMPUTER ORIENTED NUMERICAL METHODS

Duration of Lectures to be delivered : 40 Hours	Max. Marks :50	Uni. Examination - 30
		Int. Assessment - 20
Time Allowed : 3 Hours	Min.Pass Marks :	Uni. Examination - 35%
		Int. Assessment - 35%

### Course Objectives

To introduce to the students the concepts of various types of errors and its sources and effects in any numerical computation, how to get approximate solutions of linear and transcendental equations, solve the system of simultaneous linear equations numerically by using direct and iterative methods, make them able to approximate the functions using interpolating polynomials and also to know various types of truncation errors.

### Course Learning Outcomes

*Upon completion of the course, the students will be able to:*

1. Understand errors, source of errors and its effect on any numerical computation.
2. How to get an approximate solution of linear and transcendental equations.
3. Solve a system of simultaneous linear equations numerically using direct and iterative methods.
4. Able to approximate the functions using interpolating polynomials.
5. Able to know about the types of truncation errors.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

*At least 70% of the exam questions should be theoretical in nature.*

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION-A

Floating point representation of numbers, Arithmetic operations with normalised floating point numbers and its consequences, Errors in numbers, Binary representation of numbers, Solution of Transcendental and polynomial equations: Bi-section method, Regula-falsi method, Newton-Raphson method, Secant method, Iteration Method.

### SECTION - B

Solution to simultaneous linear and algebraic equations: Gauss elimination method, pivoting, ill-conditioned equations, Gauss-Seidal iterative method.

Finite difference and Interpolation : Difference operators, Divided differences, (Definition and properties), relations among operators, Newton-Gregory formulae for forward and backward interpolation, Newton's interpolation formula for divided differences, Lagrange's interpolation formula, truncation error in various interpolation formulae.

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### TEXT BOOKS

1. Rao, S. Balachandra and Shantha, C.K: 'Numerical Methods with Programs in BASIC, FORTRAN, PASCAL & C++', (2004) University Press (INDIA) Ltd.
2. Bala Guruswamy: 'Computer Oriented Statistical and Numerical Methods'(2009), Laxmi Publications
3. H.C. Saxena: 'Calculus of Finite Differences and Numerical Analysis', (2010) S.Chand and Sons, Delhi. E

### RECOMMENDED READINGS

1. B.S. Grewal: Numerical Methods in Engineering & Science With Programs In C,C++ & Matlab, ( 11<sup>th</sup> Edition) ( 2013) Khanna Publishers.
2. S.S. Sastri: Introductory Methods of Numerical Analysis, (2012), PHI Ltd.

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## STAB3505T: SAMPLE SURVEYS

Duration of Lectures to be delivered : 40 Hours      Max. Marks :50      Uni. Examination - 30

Int. Assessment - 20

Time Allowed : 3 Hours      Min.Pass Marks :      Uni. Examination - 35%  
Int. Assessment - 35%

### Course Objective:

The main objective of this course is to learn techniques in survey sampling with practical applications in daily life.

### Course Outcomes:

*At the End of this Course Students will be able :*

1. To apply various sampling methods for real data.
2. To explain and to compare various allocations using stratified random sampling.
3. To draw a conclusion about the best sampling procedure.
4. To use practical applications of ratio and regression method of estimation.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

*At least 70% of the exam questions should be theoretical in nature.*

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION-A

Concepts of population and sample, need for sampling, census and sample surveys, basic concepts in sampling. Simple random sampling (with and without replacement); estimation of population mean, population variance and population proportion, Variance of estimators of population mean, population proportion and their estimators.

### SECTION-B

Stratified random sampling: proportional, Neyman and optimum allocations, estimate of population mean, variance of the estimate and estimate of its variance, ratio and regression methods of estimation under simple random sampling without replacement, large sample expressions of their variances, comparison with mean per unit estimate.

### TEXT BOOKS

1. Singh, D., & Chaudhary, F. S.: Theory and analysis of sample survey designs.( 2<sup>nd</sup> Edition) (2020) New Age International (P) Ltd
2. Sukhatme, P.V., Sukhatme, B.V., Sukhatme, S. and Asok, C.: Sampling Theory of Surveys with Applications(3rd Edition ) (1984) Iowa State University Press, USA and ISAS, Delhi.
3. Des Raj: Sampling Theory(1967), Tata McGraw Hill, New Delhi
4. Gun, A.M., Gupta, M.K. Dasgupta, B. : An Outline of Statistical Theory, Vol.II(2013),

12/11/20

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The World press, Kolkata.

**RECOMMENDED READINGS**

1. Cochran, W. G. (2007). Sampling techniques (3rd Edition). John Wiley & Sons (INDIA).

July 2012  
Dr. [Signature]  
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## STAB3506P:STATISTICAL PRACITCAL- V

**Total Practical Sessions: 25**  
**(each of two hours)**

**Max. Marks : 50**

**Time Allowed : 3 Hours**

**Min.Pass Marks : 40%**

### Course Objectives

The main objective of this course is to practise the students, the concepts of various types of errors, its sources and effects in any numerical computation, how to get approximate solutions of linear and transcendental equations with the help of numerical data. Solve the system of simultaneous linear equations numerically by using direct and iterative methods: make them able to approximate the functions using interpolating polynomials with the help of numerical data.

Also, the main objective of this course is to learn techniques in survey sampling with the help of numerical applied data.

### Course Learning Outcomes

Upon completion of the course, the students will be able to:

1. Understand errors, source of errors and its effect on any numerical computation.
2. How to get an approximate solution of linear and transcendental equations.
3. Solve a system of simultaneous linear equations numerically using direct and iterative methods.
4. Able to approximate the functions using interpolating polynomials.
5. Able to know about the types of truncation errors.
6. To apply various sampling methods for real data
7. To explain and to compare various allocations using stratified random sampling.
8. To draw a conclusion about the best sampling procedure.
9. To use practical applications of ratio and regression method of estimation.

### INSTRUCTIONS FOR THE PAPER SETTER AND THE CANDIDATES

The setting and evaluation will be done by a board of examiners consisting of Head, External examiner and the teacher(s) involved with the teaching of this paper.

The practical paper will consist of four numerical problems and the candidates will be required to attempt any three numerical problems.

The break-up of marks for the University Examination will be as under:

Lab. Record	:	10
Viva-voice	:	10
Exercises	:	30

### Lab Course:

The questions will be based on the syllabus of the papers STAB3504T(ComputerOriented Numerical Methods) and STAB3505T(Sample Surveys).





## STAB3507T: COMPUTER NETWORKS AND DATA COMMUNICATION

<b>Duration of Lectures to be delivered :</b> 40 Hours	<b>Max. Marks :</b> 50	Uni. Examination - 30 Int. Assessment - 20
<b>Time Allowed :</b> 3 Hours	<b>Min.Pass Marks :</b>	Uni. Examination - 35% Int. Assessment - 35%

### Course Objectives:

1. To introduce the basics of data communications and computer networks.
2. To examine and understand network protocols and architectures.
3. Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
4. To educate the student in modern networking technologies.
5. Identify the different types of network topologies and protocols.
6. Familiarize the student with the basic taxonomy and terminology of the computer networking area.

### Learning Outcomes:

*On successful completion of this module, the student should be able to:*

1. Be familiar with the architecture of a number of different networks.
2. Describe the general principles of data communication.
3. Describe how computer networks are organized with the concept of layered approach.
4. Understand the principles of protocol layering.
5. Be familiar with modern communication systems.
6. Describe how routing protocols work.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION - A

Computer Networks: Uses of Computer Network, Network Hardware, Network Software, Goals and Applications of Computer networks, Structure of Computer Network: Point-to- point structure, Broadcasting structure, Types of Networks, Topologies.

Reference Models: OSI Reference Model, TCP/IP reference Model, Comparison of OSI and TCP Reference Model. Data Communication: Transmission media, Wireless communication, and the Telephone system, Introduction to cellular radio and communication satellite, Data Rate of Channel, Electromagnetic spectrum.

### SECTION - B

Switching: Circuit switching, packet switching, comparison. ALOHA Protocols: Introduction to Internetworking – Concepts, Repeaters, Routers, Bridges, and Gateways.

Internet Protocol: IP protocol, IP Addresses, Subnets, Internet Control Protocol, Introduction to interior and exterior gateway routing protocol, internet multicasting and mobile IP. Internet Applications: Domain Name System, Electronic mail, The World Wide Web, Introduction to



Multimedia - Audio, Video, Data compression, File Transfer and Remote File Access – Introduction, data transfer and distributed communication, generalised file transfer, interactive and batch transfer, FTP, FTP model, FTP interface, client-server interaction in FTP.

#### TEXT BOOKS

1. Tanenbaum, Andrew S. and Wetherall, David J., "Computer Networks", 5<sup>th</sup> Edition(2013), Pearson Education India
2. Stallings William, "Data & Computer Communication", 10th Edition, (2017) Pearson Education India.

#### REFERENCE READINGS

1. D.E. Comer, "Computer Networks and Internets", 6<sup>th</sup> Edition,(2014). Pearson Education India
2. D. Bertsekas and R. Gallager, "Data Networks", 2nd Edition, (1992).Prentice Hall.



## STAB3508T: VISUAL PROGRAMMING

Duration of Lectures to be delivered : 40 Hours	Max. Marks :50	Uni. Examination - 30
		Int. Assessment - 20
Time Allowed : 3 Hours	Min.Pass Marks :	Uni. Examination - 35%
		Int. Assessment - 35%

### Course Objective

The objective of the course is to familiarize the students with the concepts related to Visual programming like controls, menus, dialog boxes, procedures, Arrays. Also to enable students to understand basic C programming.

### Course Outcomes:

*Upon completion of the course, the students will be able to:*

1. Understand basics of VB Control fundamentals. .
2. Able to understand Menus and Dialog boxes in VB .
3. Able to understand what are procedures and Arrays in VB.
4. To be able to use class modules and COM objects.
5. To be able to understand data management with active X controls.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION-A

Introduction to Visual Programming, Types of Visual Programming, Visual Programming Components.

Introduction to Visual Basic: The Visual Basic Program Development Process: The Visual Basic Environment: Opening a Visual Basic Project: Saving a Visual Basic Project; Running a Visual Basic Project.

Visual Basic Fundamentals: Numeric Constants: String Constants: Variables: Data Types and Data Declarations; Operators and Expressions: Hierarchy of Operations: String Expressions: Library functions, Branching and Looping Statements, Relational Operators and Logical Expressions; Logical Operators: Branching with if-then block; Branching with if- then- else blocks: Selection: Select- case; Looping with for-next; Looping with do- loop; Looping with while-end.

Visual Basic Control Fundamentals: Visual Basic Control Tools; Control tool Categories; Working with controls; Naming Forms and Controls; Assigning Property Values to Forms and Controls; Executing Commands (Event Procedures and Command Buttons); Display Output Data (Labels and Text Boxes); Entering Input Data (Text Boxes); Selecting Multiple Features (Check Boxes); Selecting Exclusive Alternatives (Option Button and Frames); Assigning Properties Collectively (The With Block); Generating Error Messages (The Msg Box Function); Creating Times Events; Scrollbars;

Menus and Dialog Boxes: Building Drop-down Menus; accessing a Menu from the



Keyboard; Menu Enhancements; Submenus; Pop-up Menus; Dialog Boxes; Input Boxes; Executing and Debugging a New Project; Syntax Errors; Logical Errors; Selecting BreakPoints; Defining Watch Values; Stepping Through a Program; User-Induced Errors; ErrorHandlers.

#### **SECTION-B**

Procedures: Modules and Procedures; Sub Procedures; Event Procedures; Function Procedures; Scope; Optional Arguments.

Arrays: Array Characteristics; Array declarations; Processing Array elements; Passing Arrays to Procedures; Dynamic Array-Related Functions; Control Arrays;

Using Class Modules: Object Oriented Principles; Creating Class Modules; Using Class Modules Adding Properties and Events and Methods.

Using COM Components : Introduction to ActiveX Components and Component Object Model; Benefits of COM; Clients and Servers; Types of ActiveX Components available in Visual Basic; Creating user defined ActiveX Components; Managing Components; The Visual Component Manager; Registering and Un-Registering Components.

ActiveX Controls: Creating an ActiveX Control; Benefits of ActiveX Control; Adding Properties; Methods and Events to the Control; Managing and Distribution of the Control; Built-in ActiveX Controls.

Introduction to data controls like ADO, RDO, and ADODC.

#### **TEXT BOOKS**

1. Perry Greg.: SAMS teach yourself Visual Basic 6 in 21 days (1998) Tec media Publication
2. JERKE and NOEL: Visual Basic Complete Reference.(1999), McGraw Hill

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## STAB3509P: COMPUTER PRACTICALS-V

Total Practical Sessions: 25  
(each of two hours)

Max. Marks : 50

Time Allowed : 3 Hours

Min.Pass Marks : 40%

### Course objectives:

To Familiarize the students with the Visual basic Programming environment and apply various features of VB .To enable them to do programming and build applications in VB .

### Course Outcomes:

Based on the course Visual Basic<<STAB3508T>>

1. To be able to install Visual Basic.
2. To be able to understand the visual studio environment.
3. To be able to write basic programs in VB
4. To be able to develop applications and work with forms.
5. To be able to navigate between forms and to understand data management with Active X

### INSTRUCTIONS FOR THE PAPER SETTER AND THE CANDIDATES

The setting and evaluation will be done by a board of examiners consisting of Head, External examiner and the teacher(s) involved with the teaching of this paper.


The practical paper will consist of four exercises and the candidates will be required to attempt any three exercises.

The break-up of marks for the University Examination will be as under:

Lab. Record	:	10
Viva-voice	:	10
Development of programs & their execution	:	30

### Lab Course:

The exercises will be based on the syllabus of the paper STAB3508T(Visual Programming) using Visual Basic.





## SYLLABUS

B.Sc. (Computer Science, Statistics and Mathematics) Part – III

Outlines of Text Syllabi and Courses of Reading.

Note:-Every theory paper will be of three hours duration.

**For Examination of Session 2023-24 ,2024-25**

### 6<sup>th</sup> Semester

Code	Core/ Elective	Title of paper /subject	Hrs./ Week	Max. Marks		Total	Total Credits
				Cont. Asmt.	Uni. Exam.		
STAB3601T	Core	Communication Skills	2	20	30	50	2
STAB3602T	Core	Mechanics	4	30	45	75	4
STAB3603T	Core	Linear Algebra	4	30	45	75	4
STAB3604T	Core	Linear Programming	3	20	30	50	3
STAB3605T	Core	Design and Analysis of Experiments	3	20	30	50	3
STAB3606P	Core	Statistical Practicals-VI	4	-	50	50	2
STAB3607T	Elective	Problem Solving and Programming in Python	3	20	30	50	3
STAB3608T	Elective	Software Engineering	3	20	30	50	3
STAB3609P	Elective	Computer Practicals- VI	4	-	50	50	2
			Total	160	340	500	26

**Note: The minimum pass marks in each paper is 35% in Continuous Assessment and University Examination.**








**BREAK-UP OF CONTINUOUS ASSESSMENT MARKS THEORY  
PAPERS**

- |   |   |
|---|---|
| 1. Two house/midterm tests will be held and their average will be considered for assessment | 50% Marks                                     |
| 2. Seminars/Assignments/Quizes/<br>Class participation                                      | 25% Marks                                     |
| 3. Attendance   | 25% Marks                                     |
| Marks will be given according to below criteria:  |   |
| 75% attendance & above<br>but less than 80%   | 60% Marks of allotted<br>marks to attendance  |
| 80% attendance & above<br>but less than 85%   | 80% Marks of allotted<br>marks to attendance  |
| 85% attendance & above  | 100% Marks of allotted<br>marks to attendance |



## STAB3601T: COMMUNICATIONS SKILLS

### PART-A (THEORY)

<b>Duration of Lectures to be delivered :</b> 30 Hours	<b>Max. Marks :</b> 50	Uni. Examination - 20
		Int. Assessment – 20
		Practical- 10
<b>Time Allowed :</b> 2.5 Hours	<b>Min.Pass Marks :</b>	Uni. Examination - 35%
		Int. Assessment - 35%

#### Course Objectives

The course aims to make the students excel in listening and speaking skills. Following are some objectives of the course:

1. To make students understand different points of view while listening.
2. To make them confident enough to provide effective feedback.
3. To make them proficient in speaking through the use of phonetic transcription.
4. To prepare them to perform excellently in interviews.

#### Course Learning Outcome

Students have prepared themselves for their career through mock dialogues and interviews. They have overcome their flaw of incorrect pronunciation by learning the phonetic transcription.

#### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of two sections A and B. Each of sections A and B will have four questions from the respective sections of the syllabus. All the questions will carry equal marks.

#### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt four questions in all, selecting two questions from each section A and B.

#### SECTION –A

Listening Skills: Process of listening, barriers to listening, note taking & note making and feedback skills. Recognizing and articulating speech sounds, mock dialogue/conversation. Participating in a group discussion. Holding a mock meeting.

#### SECTION –B

Speaking Skills: Speech mechanism, articulation of sounds, phonetic transcription, components of effective talk, oral presentation, group discussion, conducting meetings etc. Types and use of audio visual aids in presentation. Preparation for participating in a mock interview for a job etc. Developing skills for conducting a meeting; attending telephonic calls.

#### RECOMMENDED READINGS

1. N Sundarajan, Business Communication, Sura College of Competition, Chennai
2. Asha Kaul, Business Communication, Prentice Hall of India, New Delhi
3. Matthukutty M Monippally, Business Communication Strategies, Tata McGraw-Hill Publishing Co., New Delhi
4. M V Rodriques, Effective Business Communication, Concept Publishing Company, New Delhi

## PART-B (PRACTICAL)

**Time Allowed: 1 hr.**

**Max. Marks: 10**

Practical Examination will be conducted by the Examiner from the following topics:

### Topics:

Recognizing and articulating speech sounds, mock dialogue/conversation. Making an oral presentation, class seminars, paper reading.

Participating in a group discussion.

Holding a mock meeting.

Preparation for participating in a mock interview for a job etc. Developing skills for conducting a meeting; attending telephonic calls.

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A signature in the middle, possibly "Arb".  
A signature on the right, possibly "Dinesh".  
A signature below it, possibly "Apt".

## STAB3602T: MECHANICS

Duration of Lectures to be delivered : 55 Hours	Max. Marks :75	Uni. Examination - 45
		Int. Assessment - 30
Time Allowed : 3 Hours	Min.Pass Marks :	Uni. Examination - 35%
		Int. Assessment - 35%

### Course Objective

The prime objective of this course is to let students learn about the basic concepts of two branches of mechanics i.e. statics and dynamics. Contents of this course covers all the fundamental concepts based upon Newton's laws of motion.

### Course Outcomes

*After completing this course, students will be able to*

1. Understand a particular portion of science dealing with the behavior of material bodies under the action of external forces.
2. Learn about the concept of a force, system of forces and their resultant in three dimensional space and various possible conditions under which an equilibrium of the system of forces lying in the same plane i.e. coplanar forces, can be attained.
3. Find the null point and null plane for a given system of forces.
4. Distinguish between stable and unstable equilibrium for a system of forces.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION-A

Conditions of equilibrium of coplanar forces in three dimensions, Work, energy and power, Forces in three dimensions, Poinsot's central axis theorem, Null lines and planes, CSMle and unCSMle equilibrium.

### SECTION-B

Velocities and accelerations along radial and transverse directions and along tangential and normal directions.

Simple harmonic motion, Elastic strings, Curvilinear motion, Elliptic orbits, Central orbits, Kepler's laws of motion.

Motion of a particle in three dimensions, Velocities and Accelerations in cylindrical and spherical coordinates.

### TEXT BOOK

1. S.L. Loney, The Elements of Statics and Dynamics Part I (Statics), 6<sup>th</sup> edition (2016) Arihant Publications
2. Synge John L. and Griffith, Principles of Mechanics, 3rd edition (1959), McGraw-Hill Inc., US;
3. Chorlton, F. : Textbook of Dynamics, 2<sup>nd</sup> edition (2002), CBS Publishers and Distributors Pvt. Ltd, N. Delhi.

## STAB3603T: LINEAR ALGEBRA

Duration of Lectures to be delivered : 55 Hours

Max. Marks :75

Uni. Examination - 45

Int. Assessment - 30

Time Allowed : 3 Hours

Min.Pass Marks :

Uni. Examination - 35%

Int. Assessment - 35%

### Course objective:

It is a basic course which help students in finding real life applications of matrix algebra and theory of vector spaces. In this course the students understand real vector spaces and subspaces and apply their properties. Students also expected to gain an appreciation for the applications of linear algebra to areas such as computer science, engineering, biology and economics.

### Course Outcomes:

1. Use computational techniques and algebraic skills essential for study of systems of linear equations, matrix algebra, vector space, eigenvalues and eigenvectors, orthogonality and diagonalization.
2. Critically analyse and construct mathematical arguments that relate to study of introductory linear algebra.
3. Use visualization, spatial reasoning as well as geometric properties to solve solution in higher dimensions
4. Realise importance of adjoint of linear transformation and its canonical form

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 6 marks each whereas section C will carry 21 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION-A

Vector Spaces and Their Elementary Properties, Subspaces and Their Examples, Sum and Direct Sum of Subspaces, Linear Dependence and Independence, Linear Combinations, Spanning Sets, Bases and Dimension for a Vector Space, Dimensions of Sum and Direct Sum of Subspaces, Quotient spaces.

Linear Transformations, Algebra of Linear Transformations, Polynomials of Linear Transformations, Products of Linear Transformations, The Null Space and the Range Space of a Linear Transformation, Rank and Nullity, Singular and non-singular Linear Transformations, Isomorphic Vector Spaces.

### SECTION-B

Dual Space and Dual Basis, Reflexivity, Annihilator, Double Annihilator, Reducibility, Projections and their combinations, Projections and Invariance, Adjoints, Adjoints of projections, The Matrix of a Linear Transformation, Matrix for the Composition and the Inverse, Similarity Transformation, Change of Bases, Eigen values and Eigen vectors, Multiplicity, Triangular form.

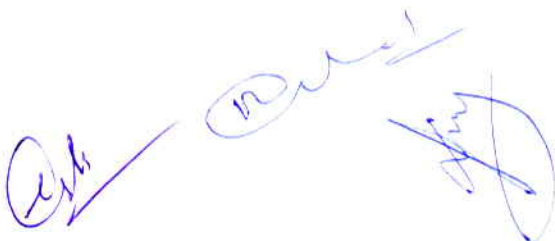
### TEXT BOOK



1. Lipschutz, S., & Lipson, M.: Schaum's Outline of Linear Algebra, Schaum's Outline Series, 3<sup>rd</sup> edition (2017) McGraw Hill Education India
2. Halmos, P. R.: Finite-dimensional Vector Spaces, 2<sup>nd</sup> edition (2017), Dover Publications.

**RECOMMENDED READING**

1. Hoffman, K., & Kunze, R: Linear algebra, 2<sup>nd</sup> edition (2015), PHI Learning Pvt. Ltd.

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## STAB3604T: LINEAR PROGRAMMING

Duration of Lectures to be delivered : 40 Hours

Max. Marks :50

Uni. Examination - 30

Int. Assessment - 20

Time Allowed : 3 Hours

Min.Pass Marks :

Uni. Examination - 35%

Int. Assessment - 35%

### Course objectives:

To impart the knowledge of formulation of practical problems using the linear programming methods and their extensions, to understand the theoretical basics of different computational algorithms used in solving linear programming problems

### Course Outcomes:

After studying this course, students will be able to:

1. Formulate a given simplified description of a suitable real-world problem as a linear programming model in general, standard and canonical forms.
2. Sketch a graphical representation of a two-dimensional linear programming model given in general, standard or canonical form
3. Solve a two-dimensional linear programming problem graphically.
4. Use the simplex method to solve small linear programming models by hand, given a basic feasible point.
5. Carry out sensitivity analysis of LPP.
6. Solve Assignment and transportation problems to obtain optimum solution.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION-A

Linear programming problems (LPPs); Examples, Mathematical formulation, Graphical solution, Solution by Simplex method, artificial variables, Big-M method and two phase simplex method.

Duality in linear programming; Concept, Mathematical formulation, fundamental properties of duality, duality and simplex method and dual simplex method.

### SECTION -B

Sensitivity Analysis: Discrete changes in the cost vector, requirement vector and Coefficient matrix. Transportation problem: initial basic feasible solution and optimal solutions using MODI method (for balanced cases only). Assignment problem; solution of balanced and unbalanced assignment problems, maximization case in assignment problem.

### TEXT BOOKS

1. Swarup, Kanti, Gupta, P. K. and Man Mohan, : Operations Research, 12th Edition (2004) Sultan Chand & Sons.

### RECOMMENDED READING

1. Kasana, H.S. and Kumar K.D.: Introductory Operations Research, 4<sup>th</sup> edition (2004) Springer
2. Taha, H. A.: Operations research: An introduction, 10<sup>th</sup> Edition (2017), Pearson Education India
3. Gass Saul I. : Linear Programming: Methods and Applications, 5<sup>th</sup> Edition (2011), Dover Publications, New York.

*Arb* *Man Mohan* *Man Mohan*



## STAB3605T: DESIGN AND ANALYSIS OF EXPERIMENTS

Duration of Lectures to be delivered : 40 Hours      Max. Marks :50      Uni. Examination - 30

Int. Assessment – 20

Time Allowed : 3 Hours

Min.Pass Marks :      Uni. Examination - 35%

Int. Assessment - 35%

### Course objectives:

To introduce the students to the concepts of ANOVA, models, basic concepts of design of experiments, complete block designs and factorial experiments as well so that they become capable to decide which complete block design is appropriate in a given situation to get the reliable objectives. students will be capable enough to interpret the analysed results of the experiment and report the conclusions.

### Course Learning Outcomes:

*Upon completion of this course the student will be able to*

1. Understand ANOVA and its types.
2. Able to understand the basics of design and analysis of experiments.
3. Able to understand the applications of complete block designs
4. Able to understand the basics of factorial experiments.
5. Able to understand the factorial designs and their applications

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

*At least 70% of the exam questions should be theoretical in nature.*

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

#### SECTION-A

Linear models, fixed effect models, distribution of minimum error sum of squares, and conditional error sum of squares, tests of general linear-hypotheses.

Analysis of one way classified data under the fixed effects model. Analysis of the two way classified data with one observation per cell and multiple but equal observations in cells under the fixed effect model. Terminology in experimental designs, basic principles of design: randomization, replication and local control.


#### SECTION - B

Completely randomized design, randomized block design and Latin square design, their advantages and disadvantages.

Concept of factorial experiments, the concept of main effects and interactions in  $2^2$  and  $2^3$  factorial experiments and the sum of squares due to them. Yate's method of computing the sum of squares due to the main effects and interactions in  $2^2$  and  $2^3$  factorial designs.

### TEXT BOOKS

1. Gun, A.M., Gupta, M.K. and Dasgupta, B. : Fundamentals of Statistics, Vol.



- II.(2016), World Press.
2. Dey, Alok " Incomplete Block Designs", (2010) .Hindustan Book Agency, World Scientific.

#### RECOMMENDED READING

1. Gupta, S.C. and Kapoor, V.K.: Fundamentals of Applied Statistics, (2014) SultanChand and Sons
2. Montgomery, D.C., "Introduction to Statistical Quality Control", 8th Edition (2019), J. Wiley.

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## STAB3606P:STATISTICAL PRACTICALS-VI

Total Practical Sessions: 25  
(each of two hours)

Max. Marks : 50

Time Allowed : 3 Hours

Min.Pass Marks : 40%

### Course Objectives:

To practise the students various techniques of ANOVA models, , complete block designs and factorial experiments as well so that they become capable to decide which design is appropriate to apply in a given situation. Students will become capable to interpret the analysed results of the experiment and report the conclusions.

Also the students will be able to write real -world problems as a linear programming model and solve them by using graphical, simplex , dual simplex etc methods. They are also able to solve assignment and transportation problems.

### Course Learning Outcomes:

*Upon completion of this course the student will be able to*

1. compute ANOVA table and its types.
2. understand the uses of design and analysis of experiments.
3. understand the applications of complete block designs.
4. understand the concept of factorial experiments.
5. understand the factorial designs and their applications.
6. formulate a given simplified description of a suitable real-world problem as a linear programming model in general, standard and canonical forms.
7. sketch a graphical representation of a two-dimensional linear programming model given in general, standard or canonical form.
8. use the simplex method to solve small linear programming models by hand.
9. Solve assignment and transportation problems to obtain optimum solution

### INSTRUCTIONS FOR THE PAPER SETTER AND THE CANDIDATES

The setting and evaluation will be done by a board of examiners consisting of Head, External examiner and the teacher(s) involved with the teaching of this paper.

The practical paper will consist of four numerical problems and the candidates will be required to attempt any three numerical problems.

The break-up of marks for the University Examination will be as under:

Lab. Record	:	10
Viva-voice	:	10
Exercises	:	30

### Lab Course:

The questions will be based on the syllabus of the papers STAB3604T (Linear programming) and STAB3605T (Design and analysis of experiments)



## STAB3607T: PROBLEM SOLVING AND PROGRAMMING IN PYTHON

Duration of Lectures to be delivered : 40 Hours      Max. Marks :50      Uni. Examination - 30

Int. Assessment – 20

Time Allowed : 3 Hours

Min.Pass Marks :

Uni. Examination - 35%

Int. Assessment - 35%

### Course Objectives:

1. Enhance the knowledge and understanding of Database analysis and design.
2. Enhance the knowledge of the processes of Database Development and Administration using SQL and PL/SQL.
3. Enhance Programming and Software Engineering skills and techniques using SQL and PL/SQL.

### Course Outcomes:

1. On completion of this course the student should be able to design, develop, and maintain Oracle Database Objects, Advanced packages, stored procedures, and triggers.
2. Working expertise of DDL and DML commands with their application on solving real time problems Knowledge of the generic structure of PL/SQL programs.
3. To apply transaction management concepts using Save point, Rollback and Commit statements

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION - A

**Introduction to Python:** History of Python, Strength and Weakness, Different Versions, Installing Python, Setting up in local environment, IDLE, Executing from file, command line from interactive mode, Python Identifiers and reserved key words.

**Python syntax:** Variables and Variables type, Data types, Data Types Conversion, Operators (Arithmetic, Comparison, Assignment, Bitwise, Logical, Membership, Identity), Operators Precedence, Python Decision making (if, el if, else, nested if), Python loops (while, for, nested loops), Break and continue statements.

**Python Collections or Sequence:** Sequence introduction, Number operations, String Operations, List, Tuple, Dictionary, Set.

**Python Functions:** Function introduction, User defined functions, Functions with parameters, Keywords and optional parameters, Scope of variables (Global and Local), Anonymous function – Lambda, In-build function, List comprehension.

### SECTION – B

**Python Modules:** Modules, Standard Modules (Sys, Math, Time), Import Statement, from statement, Dir() functions.

**Python File handling:** Sending Output to STDOUT Using the print() Method, Reading Input with the input() Method, Creating File Objects with the open() Method, Controlling File Access Modes, Working with File Object Attributes, Closing File Objects with the close() Method, Reading and Writing to File Objects with read() and write(), Using File Processing Functions from the OS Module. **OOP:** Class and object, Attributes, Inheritance, Overloading, Overriding, Polymorphism.

### TEXT BOOKS:

1. Paul Gries, Jennifer Campbell, Jason Montojo, Practical Programming- An Introduction to Computer Science Using Python 3.6, (2018), Shroff Publications and Distributors.

### RECOMMENDED READINGS

1. John V Guttag, Introduction to Computation and Programming Using Python'', Revised and expanded Edition, (2013) MIT Press.
2. Robert Sedgewick, Kevin Wayne, Robert Dondero, Introduction to Programming in Python: An Inter-disciplinary Approach, (2016), Pearson India Education Services Pvt. Ltd.,
3. Timothy A. Budd, Exploring Python,(2015), Mc-Graw Hill Education (India) Private Ltd.

*Jay* *Ad* *Rahul*  
*Rup*

## STAB3608T: SOFTWARE ENGINEERING

Duration of Lectures to be delivered : 40 Hours	Max. Marks :50	Uni. Examination - 30
		Int. Assessment - 20
Time Allowed : 3 Hours	Min.Pass Marks :	Uni. Examination - 35%
		Int. Assessment - 35%

### Course Objectives

1. Knowledge of basic SW engineering methods and practices, and their appropriate application.
2. Describe software engineering layered technology and Process framework.
3. A general understanding of software process models such as the waterfall and evolutionary models.
4. Understanding of software requirements and the SRS documents.
5. Understanding of the role of project management including planning, scheduling, risk management, etc.
6. Understanding of software testing approaches such as unit testing and integration testing.
7. Describe software measurement and software risks.
8. Understanding of software evolution and related issues such as version management.
9. Understanding on quality control and how to ensure good quality software.

### Learning Outcomes

*On successful completion of this module, the student should be able to:*

1. Basic knowledge and understanding of the analysis and design of complex systems.
2. Ability to apply software engineering principles and techniques.
3. Ability to develop, maintain and evaluate large-scale software systems.
4. To produce efficient, reliable, robust and cost-effective software solutions.
5. Ability to work as an effective member or leader of software engineering teams.
6. To manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals Identify and analyze the common threats in each domain.
7. Ability to understand and meet ethical standards and legal responsibilities.

### INSTRUCTIONS FOR THE PAPER SETTER

The question paper will consist of three sections A, B and C. Each of sections A and B will have four questions from the respective sections of the syllabus and section C will consist of one compulsory question having seven parts of short-answer type covering the entire syllabus uniformly. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

### INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all, selecting two questions from each section A and B and the compulsory question of section C. All questions of sections A and B will carry 4 marks each whereas section C will carry 14 marks.

Use of scientific non-programmable calculator is allowed.

### SECTION A

Introduction to Software Engineering: Origin, Definition and goals of Software Engineering. Comparison with traditional Engineering Disciplines.  
Software development process. Process Models: Waterfall, Spiral, Prototype, TDD (Test Driven Development). Error distribution, Effort distribution, Role of metrics and measurements.  
Software Project Planning: Planning activities, Team structure (Democratic, Chief-programmer, Hierarchical). Software Requirement Specification: Role, characteristics and components of SRS.  
Problem Analysis: Structuring Information, DFD and Data Dictionary.

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## SECTION B

Software Design: Design Objectives and principles. Design concepts – Abstraction, Information hiding, Concurrency, Modularity, Coupling-Cohesion criteria. Structured design methodology. Design specification, Metrics

Coding, Structured coding techniques: Data Encapsulation, Go to statement, Recursion, Single Entry Single Exit criteria. Structured programming.

Testing, Testing fundamentals: Error, Fault, Failure and Reliability, Levels of testing, Testcase and Test criteria, Top-down and bottom-up approach, Test case execution and analysis, Test report.

### TEXT BOOKS

1. Jalota, P. "An Integrated Approach to Software Engineering", (2005), Narosa Publishing House

### REFERENCES READINGS:

1. Fairley, R., "Software Engineering Concepts", (1985) .McGraw-Hill.
2. Sommerville, I., "Software Engineering ", (2001), Pearson Education.
3. Beizer, B. "Software Testing Techniques", 2<sup>nd</sup> edition (2002), Wiley India.
4. Roger. S. Pressman. "Software Engineering - A Practitioner's Approach". 7<sup>th</sup> edition (2017) McGraw Hill Education

## STAB3609P: COMPUTER PRACTICALS-VI

Total Practical Sessions: 25  
(each of two hours)

Max. Marks : 50

Time Allowed : 3 Hours

Min.Pass Marks : 40%

Marks

### Course Objectives

1. To explain basic database concepts, applications, data models, schemas and instances.
2. To demonstrate the use of constraints and relational algebra operations.
3. Describe the basics of SQL and construct queries using SQL.
4. Design database schema for a given application and apply normalization
5. Acquire skills in using SQL commands for data definition and data manipulation.
6. Develop solutions for database applications using procedures, cursors and triggers

### Learning Outcomes

On successful completion of this module, the student should be able to:

1. Apply the basic concepts of Database Systems and Applications.
2. Populate and query a database using SQL DML/DDL commands.
3. Use the basics of SQL and construct queries using SQL in database creation and interaction.
4. Populate and query a database using SQL DML/DDL commands.
5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS
6. Programming PL/SQL including stored procedures, stored functions, cursors, packages

### INSTRUCTIONS FOR THE PAPER SETTER AND THE CANDIDATES

The setting and evaluation will be done by a board of examiners consisting of Head, External examiner and the teacher(s) involved with the teaching of this paper. The practical paper will consist of four exercises and the candidates will be required to attempt any three exercises.

The break-up of marks for the University Examination will be as under:

Lab. Record	:	10
Viva-voice	:	10
Development of programs & their execution	:	30

### Lab Course:

The exercises will be based on the syllabus of the paper STAB3607T (Problem Solving and Programming in Python)

