Total Marks: 70

University Examination: 50

Internal Assessment: 20

Credit:3

Maximum Time: 3 Hrs.

Minimum Pass Marks: 35%

Lectures to be delivered: 45-55 Hrs.

A) Instructions for paper-setter

The question paper will consist of three sections. Section A, B and C. Section A and B will have four questions each from the respective sections of the syllabus out of which the student will be required to attempt two questions from each Section. Each question will carry 8 marks. Section C will be compulsory with 9 short-answer type questions of 02 marks each which will cover the entire Syllabus

Course Objectives

The course aims to
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

After completing this course students will be able to
1. 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
3. Knowledge of the generic structure of PL/SQL programs
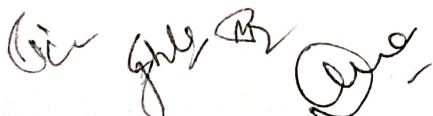4. Apply transaction management concepts using Save point, Rollback and Commit statements

Section-A

Interactive SQL SQL commands: Data Definition Language Commands, Data Manipulation Language Commands, The Data types a cell can hold, insertion of data into the table: Viewing of data into the tables, Deletion operations: Updating of contents of the table: Modifying the structure of the table. Renaming the table, Destroying tables. Data Constraints. Types of data constraints, Column Level Constraints: Table Level Constraints Null value Concepts: The UNIQUE Constraint. The PRIMARY constraints. The FOREIGN key constraint, The CHECK Constraint Viewing the User Constraints. User access rights

Viewing The Data Computations on Table Data: Arithmetic Operators: Logical Operators, Comparison Operators. Range Searching Pattern Searching ORACLE FUNCTIONS: Number Functions, Group Functions: Scalar Functions, Data Conversion Functions, Manipulating Dates in SQL: Character Functions.

Sub Queries and Joins: Joins, Equi Joins, Non Equi Joins: Self Joins: Outer Joins: Sub Queries Colla Queries: Using Set Operators-Union, Intersect: Minus.

Views and Indexes. Definition and Advantages Views: Creating and Alternating Views. Using Views, Indeed Views: Partitioned Views. Definition and Advantages of

Indexes, Composite Index and Unique Indexes, Accessing Data with and without Indexes: Creating Indexes and Statistics.

Section-B

Introduction to PL/SQL Advantage of PL/SQL: The Generic PL/SQL Block, The Declaration Section: The Begin Section: The End Section: The Character Set: Literals: PL/SQL Data types, Variables: Constants: Logical Comparison: Conditional Control in PL/SQL: Iterative Control

Advanced PL/SQL: Types of Cursors Implicit Cursor, Explicit Cursor, Explicit Cursor attributes: Cursor for Loop, Parameterized Cursor, Error Handling in PL/SQL, Internal Exceptions. User Defined Exceptions.

Database Objects: Sequences. Creating Sequences. Referencing Sequences; altering a Sequence: Dropping a Sequence. Synonyms, Creating Synonyms, Dropping Synonyms. Stored Procedures and Functions- Advantages of using a Procedure or Function; Procedure Versus Function: Creating stored Procedures and Functions: Parameters to Procedures and Functions: Deleting a stored Procedure or Function, Packages Com-ponents of a Package: Package Objects, Private and Public: Package state, Package Dependency, Triggers: Use of Database Triggers: Database Triggers v/s Procedures: Database Triggers v/s Integrity Constraints, RAISE APPLICATION_ERROR PROCEDURE: Types of Triggers- Row Triggers. Statement Triggers, Beforev/s After Triggers: Deleting a Trigger. Object Types and Varrying Arrays: User Defined Data Types, creating a Type, Varrying Array, Creating and Using Varrying array, Nested Tables.

TEXT BOOKS

> Ivan Bayross. Sql, Pl/Sql-The Programming Language Of Oracle BPB Publications, 2020.
> Ryan K Stephens and Ronald R. Plew. Sams teach yourself SQL in 21 days. Sams Publishing, 2003

RECOMMENDED READINGS

> John Adolph Palinski. Oracle SQL and PL/SQL handbook: a guide for data administrators, developers, and business analysts. Addison-Wesley Professional, 2002.

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Total Marks: 70
External. Exam: 50
Internal Assessment: 20

Course Objectives

The objective of this paper is to give exposure to students about concepts of:

1. Time series with methods of measurement of its various components.

2. Index numbers with their construction, uses and applications.

3. Demand analysis.

Course Outcomes

After completing this course students will be able to

1. Explain the concept of Time Series and its components.
2. Measure secular trend by various methods like graphical, method of semi averages, method of moving averages, fitting of Mathematical curves using Legendre's least square method.
3. Determine seasonal fluctuations by using methods of ratio-to-moving average, ratio to trend and link relatives.
4. Compute cyclical fluctuations (excluding periodogram analysis).
5. Define, interpret and understand the various applications of index numbers.
6. Understand the Problems involved in the construction of index numbers.
7. Calculate price and quantity index numbers using Laspeyre's, Paasche's, Marshal-Edgeworth, Fisher's, Drobish-Bowley , Kelly's formulae.
8. Understand the criterion of good index numbers, errors in index numbers and uses of index numbers.
9. Understand the concept of Cost of living index numbers and its uses.
10. Know the concepts of Law of demand and Price elasticity of demand.

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections, Sections A, B & C. Sections A & B will have four questions each from the respective sections of the syllabus. Each question will carry 8 marks, which may be segregated into sub-parts. Section C will be compulsory with 9 short answer type questions of 02 marks each, which will cover the entire syllabus.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

Section-A

Time Series: Definition, components of a time series, measurement of secular trend by graphical method, method of semi averages, method of moving averages, fitting of Mathematical curves using Legendre's least square method, measurement of seasonal fluctuations by using methods of ratio-to-moving average, ratio to trend and link relatives, measurement of cyclical fluctuations(excluding periodogram analysis).

Section-B

Index Numbers: Definitions, interpretation and applications of index numbers. Problems involved in the construction of index numbers, Laspeyre's, Paasche's, Marshal-Edgeworth, Fisher's, Drobish-Bowley , Kelly's formulae for index numbers. Criterion of good index numbers, Errors in index numbers, uses of index numbers. Cost of living index numbers and its uses.

Demand Analysis: Theory and analysis of consumer's demand: Law of demand, Price elasticity of demand, Estimation of demand curves; Forms of demand functions, Engel's curves, Income elasticity of demand.

TEXT BOOKS

- A. M. Gun, M.K. Gupta, and B. Dasgupta. *Fundamentals of Statistics. Vol.-II.* Third Edition. World Press, Calcutta, 2016.
- S. C. Gupta and V. K. Kapoor. *Fundamentals of Applied Statistics.* S. Chand and Sons, 2014.

RECOMMENDED READINGS

- Frederick E. Croxton, Dudley J. Cowden, and Sidney Klein. *Applied General Statistics.* PHI Learning Pvt. Ltd., 1974.

BCsM303: ADVANCED CALCULUS

Subject: Mathematics

Time Allowed: 3 Hours

Total Marks: 100
External Exam: 70
Internal Assessment: 30

Course Objectives

> The course is designed for undergraduate students to provide a concrete foundation of calculus by introducing first the basic set theory and then moving to the concept of Countability of sets. For the working knowledge to deal with the mathematical concepts of subsequent semesters the concepts of limit, continuity and differentiation in one variable with its various applications is also introduced. The behavior of sequence and series of real numbers is proposed in detail which helps in monitoring the output of functions.

Course Outcomes

After completing this course students will be able to

1. Knowledge of Principle of Countability.

2. Encounter with the set of real numbers as an uncountable set.

3. Idea about Bounded and unbounded sets, least upper and greatest lower bounds of a set.

4. Gain knowledge of Sequences and various concepts related to it like convergence, limit points, bounded and monotonic sequences, Cauchy sequence and completeness of R.

5. Applicability of various tests of convergence of Sequence and series.

6. Introduction and concrete foundation of various concepts like limit, continuity, differentiation of functions of one variable.

7. Various applications of differentiation to finding maxima and minima and Taylor series expansion.

INSTRUCTIONS FOR THE PAPER-SETTER

The question paper will consist of three sections A, B and C. Sections A and B will have four questions each from the respective sections of the syllabus and Section C will consist of one compulsory question having eleven short answer type questions covering the entire syllabus uniformly. Each question in Sections A and B will be of 12 marks and Section C will be of 22 marks.

INSTRUCTIONS FOR THE CANDIDATES

Candidates are required to attempt five questions in all selecting two questions from each of the Section A and B and compulsory question of Section C.

Section-A

The language of sets and functions - countable and uncountable sets. Real numbers - least upper bounds and greatest lower bounds.
Sequences:- limit points of a sequence, convergent sequences; bounded and monotone sequences, the limit superior and limit inferior of a sequence. Cauchy sequences and the completeness of R.
Infinite Series of non-negative terms:-convergence and divergence of series, absolute and conditional convergence. Various tests for convergence of series.   Connection between infinite series and decimal expansions, binary expansions of real numbers.(Theorem without proof only application)

Section-B

Alternating series:- Leibnitz's theorem, absolute and conditional convergence.
Series of arbitrary terms: convergence, divergence and oscillation. Abel's and Dirichlet's tests.
Calculus of a single variable: Continuity; attainment of supremum and infimum of a continuous function on a closed bounded interval, uniform continuity. Differentiability of functions. Rolle's theorem and mean value theorems. Higher derivatives, maxima and minima.Taylor's theorem - various forms of remainder, infinite Taylor expansions.

TEXT BOOKS

- Tom M Apostol. *Calculus*. Nasora Publishing House, New-Delhi, 1985.
- Tom M Apostol. *Mathematical analysis*. Nasora Publishing House, New-Delhi, 1985.
- Richard R Goldberg. *Methods of real analysis, 2nd ed.* Wiley, 1976.
- Subhash Chandra Malik and Savita Arora. *Mathematical analysis*. New Age International, 2009.

RECOMMENDED READINGS

- Halsey Lawrence Royden and Patrick Fitzpatrick. *Real analysis*. Vol. 2. Macmillan New York, 1968.
- Terence Tao. *Analysis I*. Vol. 185. Hindustan Book Agency, 2009.

Internal Assessment: 30
University Examination: 50
Viva: 20
Lectures to be delivered: 45-55 Hrs

Maximum Marks: 100
Maximum Time: 3 Hrs
Min Pass Marks: 35%
Credit :3

Instructions for paper-setter

The End-Semester examination will be of 3 hours duration and total 50 marks. The question paper will consist of three sections. Section A, B and C. Section A and B will have four questions each from the respective sections of the syllabus out of which the student will be required to attempt two questions from each Section. Each question will carry 10 marks. Section C will be compulsory with 5 short-answer type questions of 02 marks each which will cover the entire Syllabus.

COURSE OBJECTIVES

This Course will help students to follow a structured model in Security Systems Development Life Cycle (SDLC), Detect attack methodology and combat hackers from intrusion or other suspicious attempts at connection to gain unauthorized access to a computer and its resources, Protect data and respond to threats that occur over the internet.

SECTION A

Critical characteristics of Information -NSTISSC Security Model-Components of information System-SDLC-Information assurance-Security Threats and vulnerabilities-Overview of Security threats-Security Standards. Classical Cryptography-Symmetric Cryptography-Asymmetric Cryptography-Modern Cryptography-Access Control-DRM-Steganography-Biometrics.
Network security-Intrusion Prevention, detection and Management-Firewall-Ecommerce Security-Computer Forensics-Security for VPN and Next Generation Networks.

SECTION B

Host and Application security-Control hijacking, Software architecture and a simple buffer overflow-Common exploitable application bugs, shellcode-Buffer Overflow-Side-channel attacks-Timing attacks, power analysis, cold-boot attacks, defenses-Malware-Viruses and worms, spyware, key loggers, and botnets; defenses auditing policy-Defending weak applications-Isolation, sandboxing, virtual machines.
Mobile, GSM and Wireless LAN security-Protection measures - Business risk analysis-Information Warfare and Surveillance-Case study on Attack prevention, detection and response.

Recommended Books:

1 William Stallings, "Cryptography and Network Security: Principles and Practice", 6 th Edition, PHI, 2014.
2. Michael E. Whitman and Herbert J Mattord, "Principles of information Security", 6 th edition, Vikas Publishing House, 2017.
3. Bill Nelson, Amella Phillips, F. Enfinger and Christopher Stuart, "Guide to Computer Forensics and Investigations, 4 th ed., Thomson Course Technology, 2010.
4. Matt Bishop, "Computer Security: Art and Science", 1 st edition, Addison-Wesley Professional, 2015.