



COURSE OUTLINES

BACHELOR OF SCIENCE IN COMPUTER SCIENCE

NATIONAL UNIVERSITY OF PAKISTAN



Course Outlines for
Computer Science
BS Program

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Guiding Principles

The curriculum serves as a comprehensive blueprint for the teaching-learning process that students must navigate through to achieve specific academic objectives. This encompasses clearly defined objectives, a scheme of studies and learning outcomes. Knowledge rapidly evolves and new fields emerge so it is crucial to develop such curricula as are current, relevant, and impactful.

As mandated by its Charter through Section 31(2) (i), National University of Pakistan has developed curricula for various disciplines of BS Program. The criteria, schemes of studies and course outlines of HEC set the benchmark for development of schemes of studies and course outlines at National University of Pakistan. The subject committees, appointed for development of curricula, comprised of subject matter experts and researchers. In response to the evolving needs of the 21st century, National University of Pakistan, in collaboration with HEC, undertook the task of developing robust standards of curricula for BS Program.

It is hoped that this document, developed by dedicated subject experts from across the country, will not only fulfill our national educational and economic requirements but also elevate the competency levels of our graduates.

With support of affiliated colleges in implementation of these curricular standards, National University of Pakistan envisions a future where its graduates are at the forefront of scientific discovery and technological innovation, driving progress and contributing to the betterment of the society both nationally and internationally.

BS CS

Program Description

Bachelor of Science in Computer Science (BSCS) at National University of Pakistan provides an in-depth understanding of computing principles and their practical applications. It covers both theoretical foundations and practical skills necessary for designing, developing and maintaining software systems. The program includes topics such as algorithms, programming languages, software engineering, database systems, computer architecture, mobile application development and networking while also exploring advanced areas like artificial intelligence, cloud computing, cyber security and many more. The BSCS degree prepares students to solve complex computing problems in a rapidly evolving technological landscape.

Program Structure

Minimum Credit Hours	137
General Education Courses	34 credit hours (15 courses)
Disciplinary Courses	79 credit hours (25 courses)
Interdisciplinary Courses	15 credit hours (5 courses)
Internship / Field work	3 credit hours (6 to 8 weeks)
Capstone Project	6 credit hours
Program Duration	Minimum: 4 Years Maximum: 6 Years The maximum limit is further extendable to another year in extra-ordinary circumstances subject to approval of the Rector.
Semester Duration	18 weeks
Course Load (per semester)	15-19 credit hours for regular semesters (22 credit hours for remedial/deficiency/failure/repetition courses only)
3 Credit Hours (Theory)	3 classes (1 hour each) OR 2 classes (1.5 hour each) OR 1 class (3 hours) per week throughout the semester.
1 Credit Hours (Lab / Field Work)	1 credit hour in laboratory or practical work / project requires lab contact of three hours per week throughout the semester.

Scheme of Studies

Sem	Course Code	Course Title	Pre-Requisites	Cluster/ Domain	Credit Hrs (Theory + Lab)
1 st	GEN-101	Functional English	-	Gen Ed	3
	GEN-103	Application of Information and Communication Technologies	-	Gen Ed	3 (2+1)
	GEN-106	*Islamic Studies	-	Gen Ed	2
	GEN-117	Discrete Structures	-	Gen Ed	3
	CCC-111	Programming Fundamentals	-	Disciplinary	4 (3+1)
	MTD-111	***Pre-Mathematics-I	-	Math Deficiency	3
	Total Credit Hours				15
2 nd	GEN-125	Understanding of Quran-I	-	Gen Ed	(0,1)
	GEN-104	Expository Writing	Functional English	Gen Ed	3
	GEN-118	Calculus & Analytic Geometry	-	Gen Ed	3
	CCC-112	Object Oriented Programming	Programming Fundamentals	Disciplinary	4 (3+1)
	CCC-161	Database Systems	-	Disciplinary	4 (3+1)
	CCC-131	Digital Logic Design	-	Disciplinary	3 (2+1)
	MTD-112	***Pre-Mathematics-II		Math Deficiency	3
	Total Credit Hours				18
3 rd	MS-211	Probability and Statistics	-	Interdisciplinary	3
	MS-221	Multivariable Calculus	Calculus & Analytic Geometry	Interdisciplinary	3
	CCC-213	Data Structures	Object Oriented Programming	Disciplinary	4 (3+1)
	CCC-251	Software Engineering	-	Disciplinary	3
	CCC-222	Computer Networks	-	Disciplinary	3 (2+1)
	CCC-241	Artificial Intelligence	-	Disciplinary	3 (2+1)

	Total Credit Hours				19
4 th	GEN-126	**Understanding of Quran-II	-	Gen Ed	(0,1)
	GEN-119	Applied Physics	-	Gen Ed	3 (2+1)
	MATH-202	Linear Algebra	Calculus & Analytic Geometry	Interdisciplinary	3
	CCC-232	Computer Organization & Assembly Language	Digital Logic Design	Disciplinary	3 (2+1)
	CCC-221	Information Security	-	Disciplinary	3 (2+1)
	CDC-214	Theory of Automata	-	Disciplinary	3
	CDC-262	Advance Database Management Systems	Database Systems	Disciplinary	3 (2+1)
	Total Credit Hours				19
5 th	GEN-121	Introduction to Management		Gen Ed	2
	CCC-352	Operating Systems	-	Disciplinary	3 (2+1)
	CDC-353	HCI & Computer Graphics	-	Disciplinary	3 (2+1)
	CDC-333	Computer Architecture	Computer Organization & Assembly Language	Disciplinary	3 (2+1)
	CDE-371	Web Technologies	-	Disciplinary	3(2+1)
	CDE-315	Mobile Application Development	-	Disciplinary	3(2+1)
	Total Credit Hours				17
6 th	CCC-418	Analysis of Algorithms	Data Structures	Disciplinary	3
	CDC-316	Compiler Construction	Theory of Automata	Disciplinary	3 (2+1)
	CDC-334	Parallel & Distributed Computing	Operating Systems	Disciplinary	3 (2+1)
	CDE-317	Advanced Programming	Object Oriented Programming	Disciplinary	3 (2+1)
	CDE-372	Web Engineering	Web Technologies	Disciplinary	3 (2+1)
	CDE-323	Cyber Security	Information Security	Disciplinary	3 (2+1)

	Total Credit Hours				18
7th	GEN-110	Ideology and Constitution of Pakistan	-	Gen Ed	2
	MGT-221	Principles of Marketing	-	Interdisciplinary	3
	EW-421	Technical & Business Writing	Expository Writing	Interdisciplinary	3
	CCC-491	Final Year Project-I	-	Capstone Project	2 (0+2)
	CDE-442	Cloud Computing OR	-	Disciplinary	3 (2+1)
	CDE-443	Machine Learning	-	Disciplinary	3 (2+1)
	CDE-454	Software Testing & Quality Assurance	-	Disciplinary	3 (2+1)
	Total Credit Hour				16
	GEN-124	Pakistan Studies	-	Gen Ed	2
	GEN-111	Entrepreneurship	-	Gen Ed	2
	GEN-112	Civics and Community Engagement		Gen Ed	2
	GEN-120	Professional Practices		Gen Ed	2
	CCC-492	Final Year Project-II	Final Year Project-I	Capstone Project	4 (0+4)
	Total Credit Hours				12
INT-400	Field Experience/Internship				03
	Total Credit Hours of the Program				137

***Non Muslims may opt 'GEN-123 Ethics' as a substitute.**

****Non Muslims may opt 'GEN-130 Study of World Religions' as a substitute of Understanding of Quran in (Semester IV).**

***Pre-Mathematics-I and Pre-Mathematics-II courses are only for those students who have not studied Mathematics at intermediate level. Students must pass deficiency courses of Mathematics (6 credit hours) in the first year. These deficiency courses of Mathematics are offered in compliance with NCEAC (National Computing Education Accreditation Council) revised curriculum 2023. Summer semester can also be offered (if required) to cover deficiency courses.

Semester-I Course Outlines

Functional English
GEN-101

Program-Discipline	BS – Computer Science
Credit Hours	3 (3+0)
Duration	18 Weeks

Course Title: Functional English**Course Code:** GEN-101**Course Description**

The course covers the fundamental concepts of English composition and comprehension. The course is designed in such a way that students can use this knowledge to further enhance their language skills in English. The course aims at enhancing students' skill and competence in communicating their ideas in writing and speaking in English language. It primarily focuses on four areas of language i.e. listening, reading, the conventions of written English, speaking and building build-up vocabulary to help students achieve proficiency in language use.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	To <u>write</u> coherently and cohesively. To write and reply applications/ letters/ emails. To construct grammatically correct oral and written sentences. To tell and write stories/ essays.
CLO-2	To <u>pronounce</u> words in English language correctly. To <u>read</u> and interpret text written in English language. To <u>listen</u> and decipher spoken forms of English language.
CLO-3	To <u>improve</u> writing, presentation, listening and communication skills.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	- Basics of Grammar - Parts of Speech
2	Vocabulary Building (Use the Provided Booklet) - Synonyms - Antonyms - Homonyms
3	Vocabulary Building (Use the Provided Booklet) - One word Substitution - Words often confused (Pairs of Words)
4	Vocabulary Building (Use the Provided Booklet) Verbal Phrases and Idiomatic Phrases (including Phrasal Verbs)
5	Sentence Structure (simple, compound, complex and compound-complex)
6	Tenses
7	Elimination of Common Errors (Correction) Subject-Verb Agreement, Noun
8	Elimination of Common Errors (Correction) Adjective, Verb, Adverb
9	MID TERM EXAMS
10	Listening - Quiz on audios - Quiz on videos
11	Comprehension/ Reading Skill - Critical Reading - SQ4R - Reading of passages and comprehension exercises (Level Advance)
12	Public speaking - Informal communication (small talk, conversational skills) - Public speaking (overcoming stage fright, voice modulation and body language)
13	Controlled and Guided Writing

	• Pre writing (Brainstorming, mind-mapping, planning, information gathering, preparing to write), writing, search for topic sentences • Developing a theme, following up ideas and arguments, outline plans etc.
14	Paragraph Writing • Topics at the discretion of the teacher
15	Precis Writing • Rules of précis writing • Practice précis.
16	Essay Writing • Types of writing: descriptive, narrative expository, argumentative
17	Essay Writing • Expository, argumentative
18	END SEMESTER EXAMS

Recommended Books

1. College Writing Skills with Readings, by John Langan, McGraw-Hill, 5th Edition.
2. High School English Grammar & Composition by Wren & Martin
3. Practical English Grammar by A. J. Thomson and A. V. Martinet

**Application of Information and
Communication Technologies
GEN-103**

Program-Discipline	BS – Computer Science
Credit Hours	3 (2+1)
Duration	18 Weeks

Course Title: Application of Information and Communication Technologies

Course Code: GEN-103

Course Description

This introductory course in Computer Science provides a comprehensive exploration of fundamental computing concepts and practical applications. The course is designed for beginners and covers the history of computing, computer hardware and software, computer fundamentals, web programming, and the utilization of popular productivity tools.

Theoretical sessions span various aspects of computing, beginning with the definition of computers and their historical evolution. This course cover major topics related to fundamentals of computer, operating system, data communication, networking, computer security and World Wide Web. Practical insights into HTML and web page creation will be covered to enhance the students' understanding of applied technologies.

Laboratory sessions focus on hands-on applications of computing skills. Students will engage in practical exercises covering email communication, operating system tasks, Microsoft Office suite proficiency (PowerPoint, Word, Excel), and introductory HTML for web page creation. The lab sessions aim to strengthen theoretical concepts through practical application and develop essential skills for professional computing.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Understand</u> basics of computing technology i.e. Computer Hardware and Software, Basic Operations of computers, Basic OS Concepts.
CLO-2	<u>Understand</u> and can-do number systems conversions and arithmetic.

CLO-3	Have <u>knowledge</u> of network components, communication medium, Computer security and privacy.
CLO-4	<u>Analyze</u> how various applications can be used to solve different problem. Students will be able to <u>create</u> professional documents, spread Sheets and presentations using productivity tools such as MS Word, MS Excel, MS PowerPoint.
CLO-5	<u>Identify and Explore</u> valuable resources for education and research and <u>synthesize</u> information from multiple sources to achieve objectives. Students will be able to <u>use</u> email for professional communication. Students will be able to <u>create</u> professional Profile/CV.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

Practical / Lab Courses

	Exam	Weightage
(a)	End-Semester Exam	30
(b)	Mid-Semester Exam	20
(c)	Experiment/Lab Reports / Viva Voce / Project / PBL (Problem Based Learning)	50
	Total	100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline (Theory)

Week	Contents
1	Definition of Computer, Computer Processing System (Input, Process, Output), Difference between data and information, Role of Computers in various fields (Education, Business, Media, Manufacturing), History & Generations of Computers with Characteristics of each generation.
2	Types of Computers (Analog, Digital, Hybrid), Types of Digital Computer (Super, Mainframe, Mini and Micro Computer), Introduction to CBIS (Computer Based Information System), Methods of Input and Processing. Basic Operations of a computer (Input, Process, Storage, Output), Computer Elements, Processor, Memory, Hardware, Software.
3	Computer Hardware: Input devices (Keyboard, mouse etc), Output Devices (Speakers, Monitors and its Types, Printers and its Types, Plotters and its types).
4	Storage Units, Primary and Secondary Memories and their types, RAM and its Types, Cache, Hard Disks, RAID, Optical Disk Storages (DVD, CD ROM), flash memory storage systems (memory cards and readers, USB flash drives) Other types of storage systems (network and cloud storage system, smart cards)
5	Types of Computer Software: System Software and Types, Operating System, Device Drivers, Utility Software (backup and recovery utilities), Language Processors (Assembler, Compiler and Interpreter), Importance, Uses, Limitations and Types of Application Software (Productivity Software, Business Software, Entertainment Software, Educational Software), Internet Applications (Web Applications, Cloud Computing Applications, Social Media Network Applications), Others (Licensed Software, Open source Software, Shareware/Trial-ware, Freeware).
6	Software Development life Cycle (SDLC), Importance of SDLC, SDLC Phases/Steps, Personnel involved in SDLC (Project Manager, System Analyst, Programmer, Software Tester, Customer or End User).

7	Introduction to Operating System. Functions of Operating System, Types of Operating System interfaces (Command Line Interface, Menu Driven Interface, and Graphical User Interface), Examples of CLI (DOS, UNIX) and GUI (MacOS, Linux, and Windows).
8	Introduction to Mobile OS (Android and IOS)
9	MID TERM EXAMS
10	Data Communications, Data Communication Model, Data Transmission, Digital and Analog Transmission, Modems, Asynchronous and Synchronous Transmission, Modes of Communication: Simplex, Half Duplex, Full Duplex Transmission,
11	Communications Media: Guided and Unguided Medias (Cables, Wireless), Protocols (http, TCP/IP, FTP, POP3), Network Topologies (Star, Bus, Ring, Mesh), LAN, MAN, WAN, PAN.
12	Security and privacy: Malware and its Types (Virus, Worm, Adware, Spyware), Computer Virus and its Forms., Authentication and Authorization, Symptoms of Malware, How Malware Spreads, Precautions to protect computers.
13	Number Systems and Conversions: Binary, Octal, Decimal, Hexa-Decimal.
14	Internet, A Brief History, Internet Services provider, DNS, web Hosting.
15	Introduction to World Wide Web, Terms related to WWW (Web Page, Website, Web Browser, Web Server, Uniform Resource Locator and its different parts, Search Engine, Home Page).
16	Types of Websites (Web portals, News Websites, Informational Websites, Educational Websites, Personal Websites, Business Websites, Entertainment Websites)
17	Ethical and responsible use of ICT, Digital citizenship, Cybercrime and its types, Intellectual property rights.
18	END SEMESTER EXAMS

Week Wise Course Outline (Lab)

Week	Contents
1	Email: Creating an Email Account, Create and Send Email, use to various folders (Inbox, Drafts, Spam, and Sent folder etc.), Use of "To", "Subject", "Attach files button", "Send Button", "Composing Area", "CC" and "BCC". Working with Received Emails (Reading an Email, Downloading Attachments, replying to an Email), Sign out and Email Account. LMS (Google Classroom)
2	Operating System: Create file and folders, Move or delete file and folders, Basic Shortcut keys (Cut, Copy, Paste, Delete, select all etc), Windows Task Manager (ALT+CTRL+DEL), Control Panel Overview (System and Security, User Accounts, Appearance and Personalization, Network and Internet, Clock, Language and Region, Uninstall a Program), Command Prompt Overview and Commands (dir, cd, md, rd).
3	MS Power Point: Interface (Title Bar, Quick Access Toolbar, Ribbon, Horizontal and Vertical Scroll Bars, Status Bar, Zoom Slider, Notes Pane etc), Creating a Power Point Presentation, apply colors, fonts and effects, changing fill style and background, Selection of Slide layout, Add and Remove Slides, Add Text in Slides, running a Presentation, Saving Presentation, Difference Between Save and Save As.
4	MS Power Point: Formatting Text, Addition of Clipart, Addition of a Drawing, Adding Animations to the Presentation, Adding Pictures, Videos or Sounds in Presentation. Applying Slide Transition,
5	MS Word: Interface (Title Bar, Quick Access Toolbar, Ribbon, Horizontal and Vertical Scroll Bars, Status Bar), Creating a New Microsoft Word Document, opening a Document, Saving and Printing a Document, Inserting and Editing Text, Selecting Text, Copy and Moving Text (Ctrl + X, Ctrl + C, Ctrl + V), Deleting text. Inserting Page Borders, Inserting Table of Contents.

6	MS Word: Inserting Symbol, Inserting Equation, Formatting Text (Changing the Font Type and Size of Text, Changing Font Styles and Effects, Changing Case, Use of Bold, Italics, Underline, Strikethrough, Subscript, Superscript, Text Highlight Color and Font Color), Formatting Paragraph (Changing Paragraph Alignment: Align left Align Centre, Align Right, Justify ,Indenting Paragraph: Increase and decrease indent, Changing Spacing between Paragraphs and Lines), Formatting Page (Document Theme, Page Margins, Page Orientation: Portrait and Landscape, Page Background: Watermark, Page Color and Page Borders). Use of Find and Replace.
7	MS Word: Inserting Header, footer and Page numbers, Inserting Cover page, Inserting Page and Section Breaks, Inserting and Positioning Picture, Inserting Word Art
8	MS Word: Creating and Formatting table, Adding and Deleting Rows or Columns, resizing rows and columns, Adding or Changing Border Lines and Shading, Merging and Splitting Cells, Changing Margins, Using Hyperlink, make regular text as hyperlink, Remove Hyperlink.
9	MID TERM EXAMS
10	MS Excel: Opening the Microsoft Excel Program, Interface (Title Bar, Quick Access Toolbar, Cell, Row, Column, Formula Bar, Cell Address, Active Cell Address, Worksheet Window), Filling Columns and Rows, Auto fill and its options, Fill Series, Use of formulas (total, percentage, average etc), Merge and Split Cells, Insert Border on table, Wrapping Text, Use of Built in Functions (sum, product, average, max, min, power, sqrt, count).
11	MS Excel: Cell Addressing and its types (Relative Cell Addressing, Absolute Cell Addressing), Paste Special and its various options.
12	MS Excel: Resizing Rows and Columns, Insert New Rows and Columns in between, Delete Rows and Columns, Rename Sheets and Add Sheets in Excel Workbook. Graphical Representation of Data (i.e. Creating Column Chart).

13	MS Excel: Manipulating and Formatting Data (Filtering Data, Data Validation, protecting a Worksheet, Unlocking Cells, Conditional Formatting).
14	MS Paint, Elementary Video editing
15	Video Conferencing (Zoom, Google Meet).
16	Google Forms (creating data collection forms, surveys etc).
17	Development of professional CV & linked in profile (Semester Project)
18	END SEMESTER EXAMS

Recommended Books

1. Charles S. Parker, Understanding Computers: Today and Tomorrow, Course Technology, 25 Thomson Place, Boston, Massachusetts 02210, USA
2. Livesley, Robert Kenneth. An introduction to automatic digital computers. Cambridge University Press, 2017.
3. Zawacki-Richter, Olaf, and Colin Latchem. "Exploring four decades of research in Computers & Education." Computers & Education 122 (2018): 136-152.
4. Sinha, Pradeep K., and Priti Sinha. Computer fundamentals. BPB publications, 2010.
5. Alan Evans, Kendall Martin, Mary Anne Poatsy. Technology in Action. Pearson Education Inc. © 2024, ISBN 978-0-13-793278-8.

Islamic Studies
GEN-106

Program-Discipline	BS – Computer Science
Credit Hours	2 (2+0)
Duration	18 Weeks

Course Title: *Islamic Studies

Course Code: GEN-106

Course Description

This course provides Basic information about Islamic Studies to enhance understanding of the students regarding Islamic Civilization. This course discusses History of Islam, understanding of the worship and its usefulness, the basic concept of Quran Pak: wisdom, patience, loyalty. The course also discusses comparative analysis of Islam with other religions. The Concept and Value of Haqooq ul Ibad (Bandon Kay Haqooq) in Islam is discussed. The rights of people in Islamic Point of View are also discussed.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Enhance</u> the knowledge of Islam.
CLO-2	<u>Understand</u> the basic concept of Islam and Quran Pak. To enhance the skill of the students for understanding of issues related to Faith and Religious Life.
CLO-3	<u>Understand</u> the concept of Haqooq ul Ibad in the light of Quran. <u>Develop</u> an understanding of Divine Verses, Mandates and Provisions concerning permissible Methods and Modes of Islamic Trade and Commerce.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	سورة البقرة: آیت نمبر 1 تا 5 اور آیت نمبر 284 تا 286، حدیث نمبر 1، 2
2	سورة الاحزاب: آیت نمبر 6، 21، 32، 33، حدیث نمبر 3، 4
3	سورة الاحزاب: آیت نمبر 40 اور آیت نمبر 56 تا 59، حدیث نمبر 5، 6
4	سورة الفتح: آیت نمبر 29، سورة الصف: آیت نمبر 1 تا 9
5	سورة الصف: آیت نمبر 10 تا 14، سورة الحجرات: آیت نمبر 1 تا 10
6	سورة الحجرات: آیت نمبر 11 تا 18، حدیث نمبر 7، 8
7	مطالعہ سیرت کی ضرورت اور اہمیت، نبی کریم ﷺ کی حکمت انقلاب: ہجرت، مؤاخات، میثاق مدینہ
8	اسلامی تہذیب کے خصائص، اسلامی تہذیب و ثقافت کے عالمی اثرات
9	MID TERM EXAMS
10	سورة الانعام: آیات نمبر 151 تا 153، حدیث نمبر 9، 10
11	سورة الفرقان: آیت نمبر 63 تا 77، سورة النحل: آیت نمبر 12 تا 14
12	صلح حدیبیہ، خطبہ حجة الوداع، حدیث نمبر 11، 12
13	تشکیل اجتماعی و معاشرت اور اسوہ حسنہ، حدیث نمبر 13، 14، 15، 16
14	مغربی تہذیب و ثقافت اور اسلام، مغربی تہذیب و ثقافت کے خصائص و اثرات
15	تہذیبوں کے تصادم کے نظریے کا تنقیدی جائزہ، حدیث نمبر 17، 18، 19، 20
16	حدیث نمبر 21 تا 23، عشرہ مبشرہ اسلامی معاشی نظام کے بنیادی تصورات تجارت اور تجارت کے اسلامی طریقے سورة البقرة: آیت نمبر 275 سورة النساء: آیت نمبر 29 حدیث نمبر 11، 12، 16
17	حدیث نمبر 24 تا 26، امہات المؤمنین، اولاد النبی ﷺ
18	END SEMESTER EXAMS

نوٹ: نصاب میں موجود منتخب آیات (از سورة البقرة، سورة الاحزاب، سورة الفتح، سورة الصف، سورة الحجرات، سورة الانعام، سورة الفرقان، سورة النحل) اور منتخب احادیث کا ترجمہ اور تشریح دونوں مطلوب ہیں۔

ضمیمہ: منتخب احادیث مبارکہ

- 1- عَنْ عُمَرَ بْنِ الْخَطَّابِ رَضِيَ اللَّهُ عَنْهُ قَالَ: سَمِعْتُ رَسُولَ اللَّهِ ﷺ يَقُولُ: إِنَّمَا الْأَعْمَالُ بِالنِّيَّاتِ، وَإِنَّمَا لِامْرِئٍ مَّا نَوَى، فَمَنْ كَانَتْ هِجْرَتُهُ إِلَى اللَّهِ وَرَسُولِهِ، فَهَاجَرَ إِلَى اللَّهِ وَرَسُولِهِ، وَمَنْ كَانَتْ هِجْرَتُهُ إِلَى دُنْيَا يُصِيبُهَا أَوْ امْرَأَةٍ يَتَزَوَّجُهَا، فَهَاجَرَ إِلَى مَا هَاجَرَ إِلَيْهِ. صحيح البخاري (8 / 140)
- 2- عَنْ عُثْمَانَ رَضِيَ اللَّهُ عَنْهُ ، عَنِ النَّبِيِّ ﷺ قَالَ: خَيْرُكُمْ مَنْ تَعَلَّمَ الْقُرْآنَ وَعَلَّمَهُ. صحيح البخاري (6 / 192)
- 3- عَنْ مَالِكِ بْنِ أَنَسٍ قَالَ: قَالَ رَسُولُ اللَّهِ ﷺ تَرَكْتُ فِيكُمْ أَمْرَيْنِ لَنْ تَضِلُّوا مَا تَمَسَّكْتُمُ بِهِمَا: كِتَابَ اللَّهِ وَسُنَّةَ رَسُولِهِ. موطأ مالك (5 / 1323)
- 4- عَنْ ابْنِ عُمَرَ رَضِيَ اللَّهُ عَنْهُمَا قَالَ: قَالَ رَسُولُ اللَّهِ ﷺ: بُنِيَ الْإِسْلَامُ عَلَى خَمْسٍ، شَهَادَةِ أَنْ لَا إِلَهَ إِلَّا اللَّهُ، وَأَنَّ مُحَمَّدًا عَبْدُهُ وَرَسُولُهُ، وَإِقَامِ الصَّلَاةِ، وَإِيتَاءِ الزَّكَاةِ، وَحَجِّ الْبَيْتِ، وَصَوْمِ رَمَضَانَ. صحيح مسلم (1 / 45)
- 5- عَنْ عُمَرَ بْنِ الْخَطَّابِ رَضِيَ اللَّهُ عَنْهُ قَالَ: بَيْنَمَا نَحْنُ عِنْدَ رَسُولِ اللَّهِ ﷺ ذَاتَ يَوْمٍ، إِذْ طَلَعَ عَلَيْنَا رَجُلٌ شَدِيدُ بَيَاضِ الثِّيَابِ، شَدِيدُ سَوَادِ الشَّعْرِ، لَا يُرَى عَلَيْهِ أَثَرُ السَّفَرِ، وَلَا يَعْرِفُهُ مِنَّا أَحَدٌ، حَتَّى جَلَسَ إِلَى النَّبِيِّ ﷺ ، فَأَسْنَدَ رُكْبَتَيْهِ إِلَى رُكْبَتَيْهِ، وَوَضَعَ كَفَّيْهِ عَلَى فَخْذَيْهِ، وَقَالَ: يَا مُحَمَّدُ! أَخِيرَنِي عَنِ الْإِسْلَامِ. فَقَالَ رَسُولُ اللَّهِ ﷺ: «الْإِسْلَامُ أَنْ تَشْهَدَ أَنْ لَا إِلَهَ إِلَّا اللَّهُ وَأَنَّ مُحَمَّدًا رَسُولُ اللَّهِ ﷺ ، وَتُقِيمَ الصَّلَاةَ، وَتُؤْتِيَ الزَّكَاةَ، وَتَصُومَ رَمَضَانَ، وَتَحُجَّ الْبَيْتَ إِنْ اسْتَطَعْتَ إِلَيْهِ سَبِيلًا.» قَالَ: صَدَقْتَ. قَالَ: فَعَجِبْنَا لَهُ يَسْأَلُهُ وَيُصَدِّقُهُ. قَالَ: فَأَخِيرَنِي عَنِ الْإِيمَانِ. قَالَ: «أَنْ تُؤْمِنَ بِاللَّهِ، وَمَلَائِكَتِهِ، وَكُتُبِهِ، وَرُسُلِهِ، وَالْيَوْمِ الْآخِرِ، وَتُؤْمِنَ بِالْقَدَرِ خَيْرِهِ وَشَرِّهِ» قَالَ: صَدَقْتَ. قَالَ: فَأَخِيرَنِي عَنِ الْإِحْسَانِ. قَالَ: «أَنْ تَعْبُدَ اللَّهَ كَأَنَّكَ تَرَاهُ، فَإِنْ لَمْ تَكُنْ تَرَاهُ فَإِنَّهُ يَرَاكَ» قَالَ: فَأَخِيرَنِي عَنِ السَّائِلِ قَالَ: فَأَخِيرَنِي عَنْ أَمَارَتِهَا. قَالَ: «أَنْ تَلِدَ الْأُمَّةَ رَبَّتَهَا، وَأَنْ تَرَى الْخِفَاءَ الْعُرَاةَ الْعَالَةَ رِعَاءَ الشَّاءِ يَتَطَاوَلُونَ فِي الْبُنْيَانِ» قَالَ: ثُمَّ انْطَلَقَ فَلِيَتْهُ مَلِيًّا، ثُمَّ قَالَ لِي: «يَا عُمَرُ! أَتَدْرِي مَنْ السَّائِلُ؟» قُلْتُ: اللَّهُ وَرَسُولُهُ أَعْلَمُ. قَالَ: «فَإِنَّهُ جَبْرِيلُ أَتَاكُمْ يُعَلِّمُكُمْ دِينَكُمْ.» (صحيح مسلم: 1 / 37)
- 6- عَنْ سَبْرَةَ بْنِ مَعْبِدٍ الْجُهَنِيِّ رَضِيَ اللَّهُ عَنْهُ قَالَ: قَالَ النَّبِيُّ ﷺ: مُرُوا الصَّيِّ بِالصَّلَاةِ إِذَا بَلَغَ سَبْعَ سِنِينَ وَإِذَا بَلَغَ عَشْرَ سِنِينَ فَاضْرِبُوهُ عَلَيْهَا. (سنن أبي داود (1 / 133) حسن) واخرجه الترمذي في سننه ولفظه: عَلِّمُوا الصَّيِّ الصَّلَاةَ ابْنَ سَبْعَ سِنِينَ، وَاضْرِبُوهُ عَلَيْهَا ابْنَ عَشْرِ. سنن الترمذي ت شاكر (2 / 259) حسن صحيح

7. عَنْ مُعَاوِيَةَ رَضِيَ اللَّهُ عَنْهُ قَالَ: قَالَ رَسُولُ اللَّهِ ﷺ: مَنْ يُرِدِ اللَّهُ بِهِ خَيْرًا يُفَقِّهْهُ فِي الدِّينِ. صحيح البخاري (25 / 1)
8. عَنْ أَبِي هُرَيْرَةَ رَضِيَ اللَّهُ عَنْهُ قَالَ: قَالَ رَسُولُ اللَّهِ ﷺ: «مَنْ سَلَكَ طَرِيقًا يَلْتَمِسُ فِيهِ عِلْمًا، سَهَّلَ اللَّهُ لَهُ بِهِ طَرِيقًا إِلَى الْجَنَّةِ، وَمَا اجْتَمَعَ قَوْمٌ فِي بَيْتٍ مِنْ بُيُوتِ اللَّهِ، يَتْلُونَ كِتَابَ اللَّهِ، وَيَتَذَكَّرُونَ بَيْنَهُمْ، إِلَّا نَزَلَتْ عَلَيْهِمُ السَّكِينَةُ، وَعَشِيَتْهُمْ الرَّحْمَةُ وَحَقَّتْهُمْ الْمَلَائِكَةُ، وَذَكَرَهُمُ اللَّهُ فِيمَنْ عِنْدَهُ، وَمَنْ بَطَأَ بِهِ عَمَلُهُ، لَمْ يُسْرِعْ بِهِ نَسَبُهُ». صحيح مسلم (4 / 2074)
9. عَنْ أَبِي هُرَيْرَةَ رَضِيَ اللَّهُ عَنْهُ قَالَ: كَانَ رَسُولُ اللَّهِ ﷺ يَقُولُ: اَللّٰهُمَّ إِنِّي أَعُوذُ بِكَ مِنَ الْأَرْبَعِ: مِنْ عِلْمٍ لَا يَنْفَعُ، وَمِنْ قَلْبٍ لَا يَخْشَعُ، وَمِنْ نَفْسٍ لَا تَشْبَعُ، وَمِنْ دُعَاءٍ لَا يُسْمَعُ. مسند أحمد ط الرسالة (14 / 188) سنن أبي داود (2 / 92) سنن ابن ماجه (2 / 1261)
10. عَنْ ابْنِ مَسْعُودٍ رَضِيَ اللَّهُ عَنْهُ عَنِ النَّبِيِّ ﷺ قَالَ: «لَا تَزُولُ قَدَمُ ابْنِ آدَمَ يَوْمَ الْقِيَامَةِ مِنْ عِنْدِ رَبِّهِ حَتَّى يُسْأَلَ عَنْ خَمْسٍ: عَنْ عُمْرِهِ فِيمَ أَفْنَاهُ، وَعَنْ شَبَابِهِ فِيمَ أَبْلَاهُ، وَمَالِهِ مِنْ أَيْنَ اكْتَسَبَهُ وَفِيمَ أَنْفَقَهُ، وَمَاذَا عَمِلَ فِيهِمَا عِلْمٌ. سنن الترمذي ت شاكر (4 / 612)
11. عَنْ عَبْدِ اللَّهِ رَضِيَ اللَّهُ عَنْهُ قَالَ: قَالَ رَسُولُ اللَّهِ ﷺ: طَلَبُ كَسْبِ الْخَلَالِ فَرِيضَةٌ بَعْدَ الْفَرِيضَةِ. شعب الإيمان (11 / 176)
12. عَنْ أَبِي سَعِيدٍ رَضِيَ اللَّهُ عَنْهُ عَنِ النَّبِيِّ ﷺ قَالَ: اَلتَّاجِرُ الصُّوْقُ الْأَمِينُ مَعَ النَّبِيِّينَ وَالصِّدِّيقِينَ وَالشُّهَدَاءِ. سنن الدارمي (3 / 1653) سنن الترمذي ت شاكر (3 / 507)
13. عَنْ أَبِي هُرَيْرَةَ رَضِيَ اللَّهُ عَنْهُ أَنَّ رَسُولَ اللَّهِ ﷺ قَالَ: أَتَذَرُونَ مَا الْمُفْلِسُ؟ قَالُوا: الْمُفْلِسُ فَيُنَا مَنْ لَا دِرْهَمَ لَهُ وَلَا مَتَاعَ. فَقَالَ: إِنَّ الْمُفْلِسَ مِنْ أُمَّتِي يَأْتِي يَوْمَ الْقِيَامَةِ بِصَلَاةٍ، وَصِيَامٍ، وَزَكَاةٍ، وَيَأْتِي قَدْ شَتَمَ هَذَا، وَقَذَفَ هَذَا، وَأَكَلَ مَالَ هَذَا، وَسَقَكَ دَمَ هَذَا، وَضَرَبَ هَذَا، فَيُعْطَى هَذَا مِنْ حَسَنَاتِهِ، وَهَذَا مِنْ حَسَنَاتِهِ، فَإِنْ فَنِيَتْ حَسَنَاتُهُ قَبْلَ أَنْ يُقْضَى مَا عَلَيْهِ، أُخِذَ مِنْ خَطَايَاهُمْ فَطُرِحَتْ عَلَيْهِ، ثُمَّ طُرِحَ فِي النَّارِ. صحيح مسلم (4 / 1997)
14. عَنْ أَبِي الدَّرْدَاءِ رَضِيَ اللَّهُ عَنْهُ عَنِ النَّبِيِّ ﷺ قَالَ: إِنَّ أَثْقَلَ شَيْءٍ يُوَضَّعُ فِي مِيزَانِ الْمُؤْمِنِينَ يَوْمَ الْقِيَامَةِ خُلُقٌ حَسَنٌ. وَإِنَّ اللَّهَ يُبْغِضُ الْفَاحِشَ الْبَنِيَّ. شرح السنة للبخاري (13 / 78)

- 15.** عَنْ ابْنِ عَبَّاسٍ رَضِيَ اللَّهُ عَنْهُمَا أَنَّ رَسُولَ اللَّهِ ﷺ قَالَ: أَرْبَعٌ مَنْ أُعْطِيَهُنَّ فَقَدْ أُعْطِيَ خَيْرَ الدُّنْيَا وَالْآخِرَةِ: قَلْبًا شَاكِرًا، وَلِسَانًا ذَاكِرًا، وَبَدَنًا عَلَى الْبَلَاءِ صَابِرًا، وَزَوْجَةً لَا تَبْغِيهِ خَوْنًا فِي نَفْسِهَا وَلَا مَالِهِ. المعجم الأوسط (7/ 179)
- 16.** عَنْ أَبِي هُرَيْرَةَ رَضِيَ اللَّهُ عَنْهُ، عَنِ النَّبِيِّ ﷺ قَالَ: اجْتَنِبُوا السَّبْعَ الْمُؤَبِّقَاتِ. قَالُوا: يَا رَسُولَ اللَّهِ! وَمَا هُنَّ؟ قَالَ: الشَّرْكُ بِاللَّهِ، وَالسَّحَرُ، وَقَتْلُ النَّفْسِ الَّتِي حَرَّمَ اللَّهُ إِلَّا بِالْحَقِّ، وَأَكْلُ الرِّبَا، وَأَكْلُ مَالِ الْيَتِيمِ، وَالتَّوَلَّى يَوْمَ الرَّخْفِ، وَقَذْفُ الْمُحْصَنَاتِ الْمُؤْمِنَاتِ الْعَافِيَاتِ. صحيح البخاري (4/ 10)
- 17.** عَنْ أَبِي سَعِيدٍ الْخُدْرِيِّ رَضِيَ اللَّهُ عَنْهُ عَنِ النَّبِيِّ ﷺ قَالَ: مَنْ رَأَى مِنْكُمْ مُنْكَرًا فَلْيُغَيِّرْهُ بِيَدِهِ، فَإِنْ لَمْ يَسْتَطِعْ فَبِلِسَانِهِ، فَإِنْ لَمْ يَسْتَطِعْ فَبِقَلْبِهِ، وَذَلِكَ أَضْعَفُ الْإِيمَانِ. صحيح مسلم (1/ 69)
- 18.** يُجَاءُ بِالرَّجُلِ يَوْمَ الْقِيَامَةِ، فَيُلْقَى فِي النَّارِ، فَتَنْدَلِقُ أَقْتَابُهُ فِي النَّارِ، فَيَطْحَنُ فِيهَا كَطْحَنِ الْجَمَارِ بِرَحَاهُ، فَيَجْتَمِعُ أَهْلُ النَّارِ عَلَيْهِ، فَيَقُولُونَ: أَيُّ فُلَانٍ! مَا شَأْنُكَ؟ أَلَيْسَ كُنْتَ تَأْمُرُنَا بِالْمَعْرُوفِ، وَتَنْهَانَا عَنِ الْمُنْكَرِ؟ قَالَ: كُنْتُ آمُرُكُمْ بِالْمَعْرُوفِ وَلَا آتِيهِ، وَأَنْهَأُكُمْ عَنِ الْمُنْكَرِ وَآتِيهِ. شرح السنة للبغوي (14/ 352، 351)
- 19.** عَنْ أَنَسٍ رَضِيَ اللَّهُ عَنْهُ، عَنِ النَّبِيِّ ﷺ قَالَ: وَالَّذِي نَفْسِي بِيَدِهِ، لَا يُؤْمِنُ عَبْدٌ حَتَّى يُحِبَّ لِأَخِيهِ مَا يُحِبُّ لِنَفْسِهِ. صحيح مسلم (1/ 68)
- 20.** عَنِ الثُّعْمَانِ بْنِ بَشِيرٍ رَضِيَ اللَّهُ عَنْهُ يَقُولُ: قَالَ رَسُولُ اللَّهِ ﷺ: تَرَى الْمُؤْمِنِينَ فِي تَرَاحِمِهِمْ وَتَوَادِهِمْ وَتَعَاطُفِهِمْ، كَمَثَلِ الْجَسَدِ، إِذَا اشْتَكَى غُضُوًّا تَدَاعَى لَهُ سَائِرُ جَسَدِهِ بِالسَّهْرِ وَالْحُمَى. صحيح البخاري (8/ 10)
- 21.** عَنْ عَبْدِ اللَّهِ بْنِ عُمَرَ رَضِيَ اللَّهُ عَنْهُمَا: أَنَّ رَسُولَ اللَّهِ ﷺ قَالَ: أَلَا كُلُّكُمْ رَاعٍ وَكُلُّكُمْ مَسْئُولٌ عَنْ رَعِيَّتِهِ، فَالْإِمَامُ الَّذِي عَلَى النَّاسِ رَاعٍ وَهُوَ مَسْئُولٌ عَنْ رَعِيَّتِهِ، وَالرَّجُلُ رَاعٍ عَلَى أَهْلِ بَيْتِهِ، وَهُوَ مَسْئُولٌ عَنْ رَعِيَّتِهِ، وَالْمَرْأَةُ رَاعِيَةٌ عَلَى أَهْلِ بَيْتِ زَوْجِهَا، وَوَلَدِهِ وَهِيَ مَسْئُولَةٌ عَنْهُمْ، وَعَبْدُ الرَّجُلِ رَاعٍ عَلَى مَالِ سَيِّدِهِ وَهُوَ مَسْئُولٌ عَنْهُ، أَلَا فَكُلُّكُمْ رَاعٍ وَكُلُّكُمْ مَسْئُولٌ عَنْ رَعِيَّتِهِ. صحيح البخاري (9/ 62)
- 22.** عَنْ أَبِي هُرَيْرَةَ رَضِيَ اللَّهُ عَنْهُ، قَالَ: قَالَ رَسُولُ اللَّهِ ﷺ: «مَثَلِي وَمَثَلُ الْأَنْبِيَاءِ كَمَثَلِ قَصْرِ أَحْسَنِ بُنْيَانِهِ، ثَرَكٌ مِنْهُ مَوْضِعُ لَبْنَةٍ، فَطَافَ بِهَا النُّظَارُ يَتَعَجَّبُونَ مِنْ حُسْنِ بِنَائِهِ إِلَّا مَوْضِعَ تِلْكَ اللَّبْنَةِ، لَا يَعِيبُونَ سِوَاهَا، فَكُنْتُ أَنَا سَدَدْتُ مَوْضِعَ تِلْكَ اللَّبْنَةِ، خَتَمَ بَيْنَ الْبُنْيَانِ، وَخَتَمَ بَيْنَ الرُّسُلِ» وفي رواية: فَأَنَا اللَّبْنَةُ، وَأَنَا خَاتَمُ النَّبِيِّينَ. شرح السنة للبغوي (13/ 201)
- 23.** عَنْ أَنَسِ بْنِ مَالِكٍ رَضِيَ اللَّهُ عَنْهُ، عَنِ النَّبِيِّ ﷺ قَالَ: " أَرْحَمُ أُمَّتِي بِأُمَّتِي أَبُو بَكْرٍ، وَأَشَدُّهُمْ فِي أَمْرِ اللَّهِ عُمَرُ وَأَصْدَقُهُمْ حَيَاءُ عُثْمَانُ وَأَقْضَاهُمْ عَلِيٌّ،

وَأَفَرَضَهُمْ زَيْدُ بْنُ ثَابِتٍ، وَأَقْرَأَهُمْ لِكِتَابِ اللَّهِ أَبِي بَنُ كَعْبٍ، وَأَعْلَمَهُمْ بِالْحَلَالِ وَالْحَرَامِ مُعَاذُ بْنُ جَبَلٍ، أَلَا وَإِنَّ لِكُلِّ أُمَّةٍ أَمِيْنًا، وَإِنَّ أَمِيْنًا هَذِهِ الْأُمَّةِ أَبُو عُبَيْدَةَ بْنُ الْجَرَّاحِ. مسند أحمد ط الرسالة (21 / 406) سنن ابن ماجه (1 / 55)

24. عَنْ أَبِي بَكْرَةَ رَضِيَ اللَّهُ عَنْهُ يَقُولُ: رَأَيْتُ رَسُولَ اللَّهِ ﷺ عَلَى الْمِنْبَرِ وَالْحَسَنُ بْنُ عَلِيٍّ إِلَى جَنْبِهِ، وَهُوَ يُقِيلُ عَلَى النَّاسِ مَرَّةً، وَعَلَيْهِ أُخْرَى وَيَقُولُ: «إِنَّ ابْنِي هَذَا سَيِّدٌ وَلَعَلَّ اللَّهَ أَنْ يُصْلِحَ بِهِ بَيْنَ فِئَتَيْنِ عَظِيمَتَيْنِ مِنَ الْمُسْلِمِينَ. صحيح البخاري (3 / 186)

25. عَنْ عِمْرَانَ بْنِ حُصَيْنٍ رَضِيَ اللَّهُ عَنْهُمَا، يَقُولُ: قَالَ رَسُولُ اللَّهِ ﷺ: " خَيْرُ أُمَّتِي قَرْنِي، ثُمَّ الَّذِينَ يَلُونَهُمْ، ثُمَّ الَّذِينَ يَلُونَهُمْ. صحيح البخاري (5 / 2)

26. عَنْ جَابِرِ بْنِ عَبْدِ اللَّهِ رَضِيَ اللَّهُ عَنْهُ قَالَ: خَطَبَنَا رَسُولُ اللَّهِ ﷺ فِي وَسْطِ أَيَّامِ التَّشْرِيقِ خُطْبَةً الْوَدَاعِ، فَقَالَ: " يَا أَيُّهَا النَّاسُ، إِنَّ رَبَّكُمْ وَاحِدٌ، وَإِنَّ أَبَاكُمْ وَاحِدٌ، أَلَا لَا فَضْلَ لِعَرَبِيٍّ عَلَى عَجَمِيٍّ، وَلَا لِعَجَمِيٍّ عَلَى عَرَبِيٍّ، وَلَا لِأَحْمَرَ عَلَى أَسْوَدَ، وَلَا أَسْوَدَ عَلَى أَحْمَرَ، إِلَّا بِالتَّقْوَى، إِنَّ أَكْرَمَكُمْ عِنْدَ اللَّهِ أَتْقَاكُمْ، أَلَا هَلْ بَلَّغْتُ؟ "، قَالُوا: بَلَى يَا رَسُولَ اللَّهِ، قَالَ: " فَلْيُبَلِّغِ الشَّاهِدُ الْغَائِبَ. شعب الإيمان (7 / 132)

Recommended Books

1. Translation of the Holy Qur'an by Abdullah Yousuf Ali
2. The Glorious Qur'an by Dr Muhammad Tahir-ul-Qadri
3. Hameed ullah Muhammad, "Muslim Conduct of State"
4. Hameed ullah Muhammad, 'Introduction to Islam'
5. Hussain Hamid Hassan, "An Introduction to the Study of Islamic Law" Leaf Publication Islamabad, Pakistan.
6. Ahmad Hasan, "Principles of Islamic Jurisprudence" Islamic Research Institute, International Islamic University, Islamabad (Latest Edition)
7. Mir Waliullah, "Muslim Jurisprudence and the Quranic Law of Crimes" Islamic Book Service (Latest Edition)
8. H.S. Bhatia, "Studies in Islamic Law, Religion and Society" Deep & Deep Publications New Delhi (Latest Edition)
9. Dr. Muhammad Zia-ul-Haq, "Introduction to Al Sharia Al Islamia" Allama

Iqbal Open University, Islamabad (Latest Edition)

نصابی کتاب

تفہیم اسلامیات از پروفیسر محمد نواز چوہدری و دیگر یا کوئی بھی کتاب جس میں کورس آؤٹ لائن کے مطابق مواد موجود ہو

حوالہ جاتی کتاب

تفسیر القرآن العظیم از ابن کثیر
تفسیر روح المعانی از شہاب الدین محمود آلوسی
معارف القرآن از مفتی محمد شفیع
ضیاء القرآن از پیر کرم شاہ الازہری
مشکاۃ المصابیح از منظور تبریزی
معارف الحدیث از منظور نعمانی
سیرت النبی ﷺ از شبلی نعمانی و سید سلمان ندوی
الرحیق المختوم از صفی الرحمن مبارکپوری
سیر الصحابہ از شاہ معین الدین ندوی
تاریخ اسلام از شاہ معین الدین ندوی
عشرہ مبشرہ از محمود احمد ظفر
اسلامی تہذیب اور اس کے اصول و مبادی از سید ابوالاعلیٰ مودودی
اسلام اور جدید ذہن کے شبہات از سید محمد قطب
خطبات بہاولپور از ڈاکٹر محمد حمید اللہ

Other Reference Materials

1. Tafheem e Islamiyat by Prof Dr. M. Nawaz Chohdary
2. Islamic Education by M D Zafar
3. Islamic Studies by Rafique Mohammad

Discrete Structures
GEN-117

Program-Discipline	BS – Computer Science
Credit Hours	3 (3+0)
Duration	18 Weeks

Course Title: Discrete Structures

Course Code: GEN-117

Course Description

This course introduces the foundations of discrete mathematics as they apply to Computer Science, focusing on providing a solid theoretical foundation for further work. Further, this course aims to develop understanding and appreciation of the finite nature inherent in most Computer Science problems and structures through study of combinatorial reasoning, abstract algebra, iterative procedures, predicate calculus, tree and graph structures. In this course more emphasis shall be given to statistical and probabilistic formulation with respect to computing aspects.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Understand</u> the key concepts of Discrete Structures such as Sets, Permutations, Relations, Graphs and Trees etc.
CLO-2	<u>Apply</u> formal logic proofs and/or informal, but rigorous, logical reasoning to real problems, such as predicting the behavior of software or solving problems such as puzzles.
CLO-3	<u>Apply</u> discrete structures into other computing problems such as formal specification, verification, databases, artificial intelligence, and cryptography.
CLO-4	<u>Differentiate</u> various discrete structures and their relevance within the context of computer science, in the areas of data structures and algorithms, in particular

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

Practical / Lab Courses

Exam		Weightage
(a)	End-Semester Exam	30
(b)	Mid-Semester Exam	20
(c)	Experiment/Lab Reports / Viva Voce / Project / PBL (Problem Based Learning)	50
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	Mathematical reasoning.
2	Propositional and predicate logic.
3	Rules of inference
4	Proof by induction, proof by contraposition.
5	Proof by contradiction, proof by implication.
6	Set theory.
7	Relations, equivalence relations and partitions.
8	Partial orderings, recurrence relations.
9	MID TERM EXAMS
10	Functions, mappings, function composition, inverse functions, and recursive functions.
11	Number Theory.
12	Sequences, series, counting, inclusion and exclusion principle, pigeonhole principle.
13	Permutations and combinations.
14	Algorithms, Searching and Sorting Algorithms.
15	Elements of graph theory. Planar graphs.
16	Graph coloring, Graph Algorithms, Euler graph.
17	Hamiltonian path, rooted trees, traversals.
18	END SEMESTER EXAMS

Recommended Books

1. Discrete Mathematics and Its Applications, 7th edition by Kenneth H. Rosen
2. Discrete Mathematics with Applications, 4th Edition by Susanna S. Epp
3. Discrete Mathematics, 7th edition by Richard Johnsonbaugh
4. Discrete Mathematical Structures, 4th edition by Kolman, Busby & Ross
5. Discrete and Combinatorial Mathematics: An Applied Introduction by Ralph P. Grimaldi
6. Logic and Discrete Mathematics: A Computer Science Perspective by Winifred Grassman

Programming Fundamentals
CCC-111

Program-Discipline	BS – Computer Science
Credit Hours	4 (3+1)
Duration	18 Weeks

Course Title: Programming Fundamentals

Course Code: CCC-111

Course Description

This course provides fundamental concepts of programming to freshmen. This foundational course serves as the gateway to the world of programming for freshmen, offering essential concepts and skills to build a solid understanding of programming. Recognizing its pivotal role, the course is designated as a prerequisite for various subsequent courses, emphasize its significance in laying the groundwork for a comprehensive understanding of programming. As the courses is prerequisite to many other courses, therefore, students are strongly advised to cover all contents and try to achieve course learning objectives to the maximum possible level. The primary objective of this course is to equip students with a robust foundation in programming and introduce problem-solving skills. The course is taught using C++ programming language for the practical/Lab purpose, providing students with hands-on experience in applying theoretical concepts to real-world programming scenarios. Through a series of programming assignments and lab sessions, students gain practical insights into the art and science of coding.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Understand</u> the basic problem-solving steps and logic constructs.
CLO-2	<u>Apply</u> basic programming concepts by developing software and by applying debugging and testing techniques to identify and resolve errors in code.
CLO-3	<u>Design</u> and implement algorithms to <u>solve</u> real world problems.
CLO-4	Proficiently <u>use</u> modern tools and techniques, to create solutions for solving complex problems.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

Practical / Lab Courses

Exam		Weightage
(a)	End-Semester Exam	30
(b)	Mid-Semester Exam	20
(c)	Experiment/Lab Reports / Viva Voce / Project / PBL (Problem Based Learning)	50
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. 3x16 = 48 contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	• Introduction to problem solving, steps of problem solving, a brief review of Von-Neumann architecture, introduction to programming, types of programming languages, introduction to IDE.
2	• Role of compiler and linker, introduction to algorithms, introduction to flowcharts, header files and their significance, syntax and semantics.
3	• Types of errors, comments in programming, best practices and coding standards, importance of writing clean, modular and maintainable code and adhering to coding standards, basic data types and variables, escape sequences, input/output constructs or functions
4	• Basic data types and variables, escape sequences, input/output constructs or functions, C++ operators, C++ arithmetic operators, comparison and logical operators
5	• C++ operators, operator precedence, type casting and its types, C++ conditional statements and execution flow for conditional statements (if statement, if else statement, else if statement, switch statement)
6	• C++ conditional statements and execution flow for conditional statements (if statement, if else statement, else if statement, switch statement,
7	• Conditional statement using conditional operator), nested if Repetitive statements and execution flow for repetitive statements(for, while and do while loops),
8	• Nested loops, C++break and continue statement. Functions, Introduction to Functions, Function Declaration, Function Definition, Formal & Informal parameters,
9	MID TERM EXAMS

10	• C++ Function parameters, create a Function, call a Function, Parameters and Arguments, Default Parameter Value, Multiple Parameters, Return Values, Pass by Reference, Pass Arrays as Function Parameters
11	• C++ function overloading, Over riding C++ , Arrays
12	• Structures, create a Structure, Access Structure Member, One Structure in Multiple Variables, Named Structures, C++ Enumeration, (enum), Change Values, Enum in a Switch Statement,
13	• References, Creating References, Memory Address, Pointers, Creating Pointers, Dereference, Modify Pointers
14	• C++ string and string operations, pointers/references, static and dynamic memory allocation.
15	• File Handling, File I/O operations
16	• C++ File, Create and Write to a File, Read a File
17	• Exception Handling
18	END SEMESTER EXAMS

Lab sessions are aligned with theory lectures. As new concepts are covered in lectures, they will be practiced in the lab to reinforce understanding and enhance skills. Reviewing lecture topics before each lab session is recommended for effective practice.

Week Wise Course Outline (Lab)

Week	Contents
1	• Introduction Programming Fundamentals
2	• Basic Programs for understanding of syntax and language
3	• Operators and Expressions(Arithmetic, logical, relational, assignment operators)
4	• Control Structures (if, if-else, nested if,)
5	• Control Structures (Switch etc)
6	• Iterative Structures (for, while, do-while loops)
7	• Arrays / Lists
8	• Functions(User-defined functions, parameters, return values)
9	MID TERM EXAMS
10	• Recursion(Recursive functions and examples)
11	• Pointers
12	• Structures
13	• Pointers & Functions
14	• Pointers & Structure
15	• File Handling
16	• Exception Handling
17	• Semester Project
18	END SEMESTER EXAMS

Recommended Books

1. Starting out with Programming Logic & Deigns, 4th Edition, Tony Gaddis,
2. The C Programming Language, 2nd Edition by Brian W. Kernighan, Dennis M. Ritchie
3. Object Oriented Programming in C++ by Robert Lafore
4. C How to Program, 7th Edition by Paul Deitel & Harvey Deitel
5. Problem Solving and Program Design in C++, 7th Edition by Jeri R. Hanly & Elliot B. Koffman

Pre-Mathematics-I
MTD-111

Program-Discipline	BS – Computer Science
Credit Hours	3 (3+0)
Duration	18 Weeks

Course Title: ***Pre-Mathematics-I

Course Code: MTD-111

Course Description

This course is only for those students who have not studied Mathematics of intermediate level. This course provides a comprehensive exploration of fundamental mathematical concepts. It spans from complex numbers and matrices to vectors, sequences, and series. The curriculum delves into permutation, combination, probability, mathematical induction, and the binomial theorem. Functions, graphs, linear programming, and trigonometry, including identities and applications, are covered with a focus on practical problem-solving. The course aims to equip participants with a solid foundation in mathematics, fostering analytical thinking and proficiency in various mathematical domains.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Demonstrate</u> proficiency in complex number theory, including properties and solving equations.
CLO-2	<u>Apply</u> algebraic operations to matrices and determinants, solving linear equations systematically. <u>Apply</u> vector operations and products effectively in both two and three-dimensional spaces.
CLO-3	<u>Apply</u> trigonometric identities to solve complex equations and real-world problems involving triangles and circles.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	• COMPLEX NUMBERS: Introduction, Properties, and Solution of equations.
2	• MATRICES AND DETERMINANTS: Introduction, Algebra of Matrices, Determinants, Properties of Determinants.
3	• MATRICE ROW OPERATIONS: Row and Column Operations, Solving System of Linear Equations.
4	• VECTORS: Vectors in Plane, Vectors in Space, Properties of Vector Addition, Properties of Scalar Multiplication, Dot or Scalar Product, Cross or Vector Product, Scalar Triple Product.
5	• SEQUENCES AND SERIES: Introduction, Arithmetic Sequence, Arithmetic Mean, Arithmetic Series, Geometric Sequence,
6	• SEQUENCES AND SERIES: Geometric Mean, Geometric Series, Harmonic Sequence, Harmonic Mean.
7	• PERMUTATION, COMBINATION AND PROBABILITY: Factorial of a Natural Number, Permutation, Combination, Probability
8	• BINOMIAL THEOREM: Binomial Theorem, Binomial Series.
9	MID TERM EXAMS
10	• FUNCTIONS AND GRAPHS: Function, Inverse Function, Graphical Representation of Functions
11	• TRIGONOMETRIC IDENTITIES OF SUM AND DIFFERENCE OF ANGLES: Fundamental Law of Trigonometry, Trigonometric Ratios of Allied Angles.
12	• Double, Half and Triple Angle Identities, Sum, Difference and Product of sine and cosine.
13	• APPLICATION OF TRIGONOMETRY: Solving Triangles, Area of a Triangle

14	• FUNCTIONS AND SOLUTION OF TRIGONOMETRIC EQUATIONS: Period of Trigonometric Functions, Graphs of Trigonometric Functions.
15	• Solving Trigonometric Equations Graphically, Inverse Trigonometric Functions
16	• General Trigonometric Equations
17	REVISION
18	END SEMESTER EXAMS

Recommended Book

1. A Textbook of Algebra and Trigonometry Mathematics for class XI National Book Foundation, Islamabad.

Semester-II Course Outlines

Expository Writing
GEN-104

Program-Discipline	BS – Computer Science
Credit Hours	3 (3+0)
Duration	18 Weeks

Course Title: Expository Writing

Course Code: GEN-104

Course Description

This required course focuses on writing clearly and cogently, overcoming prevalent errors in language, mastering rules in grammar and syntax, and developing skills in organizing and structuring different forms of writing. The course consists of two major parts: the reading section-focuses on recognizing a topic sentence, skimming, scanning, use of cohesive devices, identifying facts and opinions, guess meanings of unfamiliar words etc. The writing section deals with the knowledge and the use of various grammatical components and essay writing skills which would enable students to write effective and advanced expository writing.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	Develop their writing through a series of steps, the first of which is critical reading of passages.
CLO-2	Practice writing to refine their macro level as well as micro level compositional skills for professional purposes.
CLO-3	Employ various modes like argument, cause and effect, narration, description, comparison and contrast exemplification and classification in their writings.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	- Understanding Expository Writing & its purpose - Differentiating expository writing from other forms of writing (descriptive, narrative, persuasive) - Basic features (It informs, it is factual, presented in a logical format, clear about its purpose; it is not subjective, not an attempt to change reader's mind or shape their perspective)
2	Reading for writing - Reading strategies - Critical Reading skills - Find specific and general information quickly - Distinguish between relevant and irrelevant information according to purpose for reading - Distinguish between fact and opinion
3	Writing Process Generating ideas (collecting information in various forms; brainstorming, mind maps, tables, lists, charts, outlining, clustering)
4	Ordering Information/Text organization - Chronology - Stages of a process - From general to specific and vice versa - From most important to least important - Advantages and disadvantages - Cause and effect - Comparison and contrast - Problem solution pattern
5	Drafting Free Writing

	• Revisions • Editing • Paraphrasing
6	Coherence and Cohesion • Cohesive devices (linking words, connectors, discourse markers, transitional words) • Paragraph Unity (Developing a single idea thoroughly and linking it to the rest of essay/writing) • Ordering sentences in a logical manner • Transition links in sentences
7	Ethical Considerations in Expository Writing • Honesty, integrity, and accuracy in writing • Avoiding bias and presenting balanced viewpoints • Respecting copy and intellectual property rights
8	• Paragraph writing: simple, compound and complex sentence structure • Practice with every day topics
9	MID TERM EXAMS
10	• Characteristics of narrative, descriptive, and argumentative paragraphs • Essay writing Descriptive, narrative, discursive, and argumentative
11	• Identification of tone, diction, voice
12	Writing for Professional Purposes • Cover Letter formats • Cover Letter writing • Resume formats • Resume Writing • Email format • Email etiquettes

13	Visual Communication in Expository Writing • Selecting appropriate images and visual elements • Creating effective charts, graphs, and infographics • Ensuring accessibility of visual content • Ensuring readability of visual content
14	Understanding AI Writing Context • Exploring the intersection of artificial intelligence and expository writing • Analyzing the role of AI in generating written content
15	• Identifying opportunities and challenges in AI-assisted writing • Ethical considerations in AI-generated writing
16	Writing for Digital Platforms • Adapting expository writing for online audiences • Blogging and content creation • Search engine optimization (SEO) for online writing • Engaging readers through social media and interactive blogs
17	REVISION
18	END TERM EXAMS

Recommended Books

1. On writing well: The classic guide to writing nonfiction, Zinsser W. Harper Perennial, 2006
2. A Practical Guide to Business Writing: Writing in English for Non-Native Speakers, Khaled Al- Maskari, Wiley, 2012
3. Effective Communication Skills: The Foundations for Change, John Nielsen, 2008
4. College Writing Skills with Readings, by John Langan, McGraw-Hill, 5th Edition.
5. High School English Grammar & Composition by Wren & Martin
6. Practical English Grammar by A. J. Thomson and A. V. Martinet

Calculus and Analytic Geometry
GEN-118

Program-Discipline	BS – Computer Science
Credit Hours	3 (3+0)
Duration	18 Weeks

Course Title: Calculus and Analytic Geometry

Course Code: GEN-118

Course Description

This course provides foundation and basic ground for calculus and analytical geometry background.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Understand</u> the concepts of limits, continuity, and differentiation in calculus and their applications.
CLO-2	<u>Apply</u> techniques of differentiation and integration to solve real-world problems.
CLO-3	<u>Analyze</u> and interpret geometrical and physical meanings of derivatives and integrals.
CLO-4	Demonstrate proficiency in <u>solving</u> problems related to extreme values, mean value theorems, and applications of integrals.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	Limits and Continuity; Introduction to functions, Introduction to limits.
2	Techniques of finding limits, indeterminate forms of limits.
3	Continuous and discontinuous functions and their applications.
4	Differential calculus; Concept and idea of differentiation.
5	Geometrical and Physical meaning of derivatives, Rules of differentiation, Techniques of differentiation.
6	Rates of change, Tangents and Normal lines, Chain rule.
7	Implicit differentiation, linear approximation, Applications of differentiation.
8	Extreme values of functions.
9	MID TERM EXAMS
10	Mean value theorems.
11	Maxima and Minima of a function for single-variable, Concavity.
12	Integral calculus; Concept and idea of Integration, Indefinite Integrals.
13	Techniques of integration, Riemann sums and Definite Integrals.
14	Applications of definite integrals, Improper integral, Applications of Integration.
15	Area under the curve, Analytical Geometry
16	Straight lines in 3D.
17	Equations for planes.
18	END SEMESTER EXAMS

Recommended Books

1. Calculus and Analytic Geometry by Kenneth W. Thomas.
2. Calculus by Stewart, James.
3. Calculus by Earl William Swokowski; Michael Olinick; Dennis Pence; Jeffery A. Cole.

Understanding of Quran-I
GEN-125

Program-Discipline	BS - Computer Science
Credit Hours	(0,1)
Duration	18 Weeks

Course Title: Understanding of Quran-I

Course Code: GEN-125

Course Description

This required course focuses on writing clearly and cogently, overcoming prevalent errors in language, mastering rules in grammar and syntax, and developing skills in organizing and structuring different forms of writing. The course consists of two major parts: the reading section-focuses on recognizing a topic sentence, skimming, scanning, use of cohesive devices, identifying facts and opinions, guess meanings of unfamiliar words etc. The writing section deals with the knowledge and the use of various grammatical components and essay writing skills which would enable students to write effective and advanced expository writing.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

- Develop the ability to understand basic words of the Quran, phrases and sentences that do not contain verbs (unit 1 to 5 of Muallim ul Quran Book) and then sentences having present tense (first half of unit 6 of Muallim ul Quran Book).
- Acquire a strong foundation for understanding long verses of the Quran with clarity.
- Comprehend Quranic vocabulary, particles (operative & non operative particles), compounds (Adjective & Possessive compound), pronouns (singular & plural) and types of plural through hundreds of Quranic sentences.
- Recognize and understand different styles of Quranic sentences, including nominal sentence, emphatic sentence, double emphatic sentence, negative sentence, interrogative sentence, oath –based sentences.
- Strengthen understanding of fundamental Quranic linguistic styles, expressions and idioms.
- Understand at least 30to 40%of each page of the holy Quran.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. 3x16 = 48 contact hours in the semester.

Week Wise Course Outline

Week	Lessons	Assignments/Home Task	Linguistic Rules
1	1-6	Writing the meaning of Quranic words Lesson 1-8	Proper Noun Masculine & Feminine
	9-14	Writing the meaning of Quranic words 9-14	Two kinds of plural Concept of (و) "And" Common Noun
2	15-17	Writing the meaning of Quranic Words, phrases & Translation of Sentences 15-17	Demonstrative Noun (This & That for Masculine (هذه - هذا) Demonstrative Noun (This & That for Feminine) (ذلك - تلك)
	18-19 & Revision (Unit 1)	Writing the meaning of Quranic words, Phrases & Translation of sentences 17-19 QUIZ	Laam for emphasis (لام التأكيد) Superlative Degree like أكبر Revision of all Quranic Sentences
3	1-3	Writing the meaning of Quranic words, phrases & translation of Sentences 1-3	Emphatic Particle إِنَّ Preposition "for" (في) (اللام)
	4-6	Writing the meaning of Quranic words, phrases & translation of Sentences 4-6	Preposition (على - من - الى)
4	7-9	Writing the meaning of Quranic words & translation of Sentences 7-9	Preposition (الباء) Absolute Negation Particle Exceptive Particle (لا النافية للجنس - ما النافية - الّا)
	10-13 & Revision (Unit 2)	Writing the meaning of Quranic words, phrases & translation of Sentences 10-13 QUIZ	Subordinating Conjunction (أن), Was (كان), Vocative Particle (حرف النداء)
5	1-2	Writing the meaning of Quranic phrases 1-2	Quranic Adjective Compounds (صفت وموصوف)

	3-5	Writing the meaning of Quranic words, phrases & translation of Sentences 3-5	Quranic Possessive Construction (مضاف ومضاف اليه)
6	6-7	Writing the meaning of Quranic phrases & Translation of Sentences 8-10	Quranic Possessive Construction (مضاف ومضاف اليه)
	8-10 & Revision (Unit 3)	Writing the meaning of Quranic words, phrases & translation of Sentences 3-5 QUIZ	Active Participle (اسم الفاعل), Passive Participle (اسم المفعول), Dual (مثنى)
7	1-2	Writing the meaning of Quranic phrases & Translation of Sentences 1-2	Personal Pronoun He (هو المنفصل) Possessive Pronoun His (ه المتصل)
	3-4	Writing the meaning of Quranic words, phrases & translation of Sentences 3-4	Possessive Pronouns with Prepositions like في Pronoun "His" with prepositions like له , منه , فيه
8	5-8	Writing the meaning of Quranic Sentences 5-8	Personal Pronoun YOU (له - منه - فيه) Possessive Pronoun Your (أنت المنفصل) Possessive Pronouns with Prepositions like في Pronoun "your" with prepositions Like., لك , منك , فيك
9	MID TERM EXAMS		
10	9-11	Writing the meaning of Quranic phrases & sentences 9-11	Personal Pronoun She (هي المنفصل) Possessive Pronoun Her (ي المتصل) Possessive Pronoun with prepositions Like في Pronoun "Her" with prepositions like لها ,
	12-14	Writing the meaning of Quranic phrases & sentences 12-14	Personal Pronoun (أنا المنفصل) Possessive Pronoun Her ي المتصل

11	15-16	Writing the meaning of Quranic phrases & sentences 15-16	Possessive Pronoun with Prepositions like Pronoun "My" with prepositions like لي
	17 & Revision (Unit 4)	Revision of all Quranic sentences of Unit 4 QUIZ	Adverb (حال)
12	1-2	Writing the meaning of Quranic phrases & sentences 1-2	Masculine Plural جمع المذكر السالم وجمع المذكر السالم المسبوق بحرف الجر
	3-4	Writing the meaning of Quranic phrases & sentences 3-4	Possessive Construction with Plurals جمع المذكر السالم المسبوق بالإضافة
13	5-6	Writing the meaning of Quranic phrases, sentences & verses 5-6	Personal Pronoun They (هم المنفصل) Personal Pronoun Their (هم المتصل)
	7-8	Writing the meaning of Quranic phrases, sentences & verses 7-8	Possessive Pronoun with Prepositions like في بينهم Pronoun "Their" with prepositions like لهم
14	9-11	Writing the meaning of Quranic phrases, sentences & verses 9-11	Personal Pronoun You (أنت المتصل) Personal Pronoun Your (كم المتصل) Personal Pronoun with Prepositions في بكم
	12-14	Writing the meaning of Quranic phrases & sentences & verses 12-14	Pronoun "Your,, with prepositions like كم Personal Pronoun We (نحن المنفصل) Possessive Pronoun Our like (نا المتصل)
15	15-16	Writing the meaning of Quranic sentences & verses 15-16	Possessive Pronouns with Prepositions like في بيتنا Pronoun "Our" with prepositions like لنا
	17-18	Writing the meaning of Quranic sentences & Verses 17-18	Demonstrative Pronoun: These, Those (هؤلاء – أولئك)

16	19-20	Writing the meaning of Quranic sentences & Verses 19-20	ما / إلا، إن / إلا، إنا، ليس، ما، (/ لم، أن، بل، كأن،
	21-22	Writing the meaning of Quranic sentences & Verses 21-22	(ألا، أليس، اليوم، يومئذ، سبحان، ما بينها، قل، إذن، بئس، نعم، كلا، ما أدراك، حسب، أعلم ب، مصير، مرجع، دينا (تبييض)
17	23	Translation of Quranic Sentences & Verses 23	(ألا، أليس، اليوم، يومئذ، سبحان، ما بينها، قل، إذن، بئس، نعم، كلا، ما أدراك، حسب، أعلم ب، مصير، مرجع، دينا (تبييض)
	Revision (Unit 5)	QUIZ	Revision of all Quranic Sentences
18	END SEMESTER EXAM		

Recommended Book

1. Muallim ul Quran (Volume1&2) by Dr. Ubaid ur Rahman

Other material, content and books

1. Paper book: All volumes are available in printed book form.
2. Tutorial videos: Teaching video of each lesson available on YouTube.
3. Confirmation Videos: A complete series of confirmation videos of all lessons is available, in which the student can confirm his answers.
4. A flipbook: A flipbook edition is also accessible.
5. Helping material: Helping material for the teachers like quizzes, question papers and images is available on website.

Object Oriented Programming
CCC-112

Program-Discipline	BS – Computer Science
Credit Hours	4 (3+1)
Duration	18 Weeks

Course Title: Object Oriented Programming

Course Code: CCC-112

Course Description

The course aims to focus on object-oriented concepts, analysis and software development. The basic concept of OOP is covered in this course. This course provides a comprehensive study of object-oriented concepts, analysis, and software development, with a primary focus on understanding and applying the principles of the object-oriented paradigm. The course guides students in identifying objects and establishing their relationships to formulate effective object-oriented solutions. Emphasis is placed on modeling solutions for diverse problems using object-oriented principles, and students will gain the ability to examine object-oriented solutions. The curriculum encompasses essential topics such as inheritance, polymorphism, composition, aggregation, multiple inheritance, and generic programming concepts. Additionally, students will explore advanced subjects and by the end of the course, students will have a solid foundation in object-oriented design and programming, empowering them to develop robust and efficient software solutions. The course is taught using C++ it provides students with hands-on experience in applying theoretical concepts to real-world programming scenarios. Through a series of programming assignments and lab sessions, students gain practical insights into the art and science of coding.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Understand</u> principles of object-oriented paradigm.

CLO-2	Identify the objects & their relationships to build object-oriented solution.
CLO-3	Model a solution for a given problem by applying object-oriented principles.
CLO-4	Examine an object-oriented solution.
CLO-5	Proficiently use modern tools and techniques, to create solutions for solving complex problems.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

Practical / Lab Courses

Exam		Weightage
(a)	End-Semester Exam	30
(b)	Mid-Semester Exam	20
(c)	Experiment/Lab Reports / Viva Voce / Project / PBL (Problem Based Learning)	50
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	Introduction to modular programming, Advantages of modular programming, Introduction to object-oriented design, history and advantages of object-oriented design, introduction to object-oriented programming (OOP) concepts.
2	Applications of OOP, classes and objects, object properties and behaviors, Class declaration and instantiation, Data encapsulation and abstraction.
3	C++ OOP, C++ Classes, Objects, create a Class, Create an Object, Class methods, Parameters, Constructors and Destructors, Access Specifiers
4	Constructors, Parameterized Constructors and Default Constructors, Destructors, Static data members & functions
5	Friend function and Friend class, Virtual functions, Inline functions, Constant and Volatile functions, passing objects to functions and Returning objects from functions, const vs non-const functions, Abstract Class.
6	Encapsulation, Access Private Members (use of public "get" and "set" methods), Inheritance, Types of inheritance (Multilevel Inheritance, Multiple Inheritance)
7	Method Overloading and Method Overriding in C++, Different ways to Overload a Function Inheritance, Access modifiers and their types (public, protected and private)
8	Single and Multiple inheritance, Multilevel inheritance Hierarchical inheritance, Hybrid inheritance, Virtual base class
9	MID TERM EXAMS

10	Relationship Types (Generalization, Specialization, is-a relationship, has-a relationship, Composition, Aggregation)
11	Polymorphism, Real life example of Polymorphism in C++, Static Binding vs. Dynamic Binding,
12	Pointers, Pointers to objects, this pointer, pointers to derived classes,
13	Revisiting pointers (new and deleted keywords), Abstract classes and interfaces, Virtual and pure virtual functions.
14	Generic Programming Concepts, Functions & class templates
15	Standard template library, Object streams, data and object serialization using object streams.
16	Exception handling in C++, why exception handling is used, Different types of exceptions, Multiple exception handling
17	C++ Exceptions, Exception handling, C++ try and catch, Handle any type of exception
18	END SEMESTER EXAMS

Lab sessions are aligned with theory lectures. As new concepts are covered in lectures, they will be practiced in the lab to reinforce understanding and enhance skills. Reviewing lecture topics before each lab session is recommended for effective practice.

Recommended Books

1. Starting Out with C++ from Control Structures to Objects, 9th Edition, Tony Gaddis
2. C++ How to Program, 10th Edition, Deitel & Deitel.
3. Object Oriented Programming in C++, 3rd Edition by Robert Lafore

Database Systems
CCC-161

Program-Discipline	BS – Computer Sciences
Credit Hours	4 (3+1)
Duration	18 Weeks

Course Title: Database Systems**Course Code:** CCC-161**Course Description**

This course provides a comprehensive introduction to fundamental database concepts, different data models, data storage and retrieval techniques, and database design principles. The course primarily focuses on the relational data model and Database Management System (DBMS) concepts that help students to gain a solid understanding of databases. Additionally, the use of Structured Query Language (SQL) is extensively covered, enabling students to define and manipulate databases in any DBMS. Topics include entity-relationship modeling, SQL joins, subqueries, grouping, aggregation, concurrency control, database backup and recovery, and the role of indexes. NoSQL systems are also introduced to provide a broader perspective on contemporary database technologies.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Explain</u> fundamental database concepts.
CLO-2	<u>Design</u> conceptual, logical and physical database schemas using different data models.
CLO-3	<u>Identify</u> functional dependencies and resolve database anomalies by normalizing database tables.
CLO-4	<u>Use</u> Structured Query Language (SQL) for database definition and manipulation in any DBMS.
CLO-5	Proficiently <u>use</u> modern tools and techniques, to create solutions for solving complex problems.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

Practical / Lab Courses

Exam		Weightage
(a)	End-Semester Exam	30
(b)	Mid-Semester Exam	20
(c)	Experiment/Lab Reports / Viva Voce / Project / PBL (Problem Based Learning)	50
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. 3x16 = 48 contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	Introduction to Databases, Examples of databases, Data, Information, Basic database concepts, Metadata, File Processing System, Disadvantages of file processing system, Database Management System, Components of Database environment, Advantages and disadvantages of Database Management System, Database approach vs. file based approach.
2	Database Architecture. Three level schema architecture, data independence (Physical Data Independence, Logical Data Independence), Data Models, Types of Record Based Data Models (Hierarchical Model, Network Model Relational Model), Attributes, Schemas, Tuples, Domains, Relation instances, Data dictionary and its uses, Database administrator (DBA), Functions of DBA.
3	Relational Model terminologies (Relation schema, instance, Tuple, Attributes, Domain, Degree, Cardinality), Keys of relations (Super key, Candidate key, Primary key, Alternate key, Composite key, Foreign key), Types of Relations (Base Tables, Query Results, Views), Advantages of views,
4	Integrity constraints (Entity integrity, Domain Integrity, Referential Integrity), Relational algebra, Selection (σ), Projection (π), Cartesian product ($\times$), Joins (Theta, Natural, Outer), Set operators (Union, Intersection, Difference).
5	Database anomalies, Normalization and its purpose, Normal forms (First Normal Form till Fifth Normal Form), Apply first three normal forms on given relation, Functional dependency, Full Functional dependency, Transitive dependency, Multi valued dependency.

6	Entity relationship (ER) model, Advantages of ER Models, Entity sets, Attributes and its types, Relationship and its types (Unary, Binary, Ternary), Types of Binary Relationships (One to one, one to many, many to many), Weak and Strong Entities, Associative Entities, Cardinality and Modality, Symbols used in Entity-Relationship Diagrams, Entity-relationship Diagrams (ERD), Generalization, Specialization.
7	Introduction to Structured Query Language (SQL) and RDBMS, types of SQL Commands: DDL (Data Definition Language), DML (Data Manipulation Language).
8	SQL Commands: DQL (Data Query Language), TCL (Transaction Control Language), DCL (Data Control Language).
9	MID TERM EXAMS
10	SQL syntax, SQL commands using select, select distinct, where, order by, and, or, not, insert into, null values, update, delete, select top, min and max, count, sum, average.
11	SQL commands using like, in, between, aliases, union, group by, having, exists, any, all, select into, insert into. SQL commands using case, null functions, stored procedures, comments, and operators.
12	SQL Database (create db, drop db, backup db, create table, drop table, alter table, constraints, not null), Commit, Rollback, Save points.
13	SQL Database (unique, primary key, foreign key, check, default, index, auto increment, dates, views, injection, hosting, data types).
14	Joins, Types of joins (inner join, left join, right join, full join, self-join), sub queries in SQL, Grouping and aggregation in SQL.

15	• Access Control, Types of discretionary Privileges, Using the Grant option, Introduction to Distributed Database Management System.
16	• Database Security Threats, Measures Against Threats, Concurrency control, Transaction, Commit and Rollback, Database backup and recovery, Types of Backups (Full backup, Incremental backup, Offline Backup, Online backup)
17	• Indexes, NoSQL systems, Types of NoSQL databases, comparison with relational databases.
18	END SEMESTER EXAMS

Lab sessions are aligned with theory lectures. As new concepts are covered in lectures, they will be practiced in the lab to reinforce understanding and enhance skills. Reviewing lecture topics before each lab session is recommended for effective practice.

Week Wise Course Outline (Lab)

Week	Contents
1	Introduction to SQL and database concepts, writing basic SQL statements, understanding the SELECT statement, arithmetic expressions, operator precedence, handling NULL values, column aliases, concatenation operators, and displaying table structure.
2	FROM clause, table lists, and table aliasing, along with practical exercises.
3	WHERE and ORDER BY clauses, covering filtering data, comparison operators, logical operators, and sorting data.
4	Logical operators and their precedence, multiple conditions in the WHERE clause, and combining ORDER BY with other clauses for efficient data retrieval.
5	Single-row functions, including character functions, number functions, date functions, and type conversion functions.
6	Multi-row functions such as SUM, AVG, STDDEV, and VARIANCE, along with subgrouping data using the GROUP BY clause and applying the HAVING clause for filtering grouped data.
7	Joins, explaining cross products, natural joins, equi-joins, and non-equi-joins.
8	Advanced joins, including left outer joins, right outer joins, and self-joins, along with real-world applications.
9	MID TERM EXAMS
10	Subqueries, discussing their use, syntax, multiple-column subqueries, and pairwise comparisons.
11	Advanced subqueries, covering non-pairwise comparisons, handling NULL values in subqueries, and using subqueries in the FROM clause.

12	• Creating SQL tables using the CREATE TABLE statement, defining constraints at the column and table levels, and understanding NOT NULL, UNIQUE, and PRIMARY KEY constraints.
13	• Altering and dropping tables, using the ALTER TABLE statement to modify tables, and applying the DROP statement to remove database objects.
14	• Data manipulation, including inserting data using the INSERT statement, modifying existing data with the UPDATE statement, and deleting records using the DELETE statement.
15	• SQL objects: understanding and creating views, modifying and dropping views, and exploring their use cases in SQL.
16	• SQL objects: working with sequences and indexes, creating and managing them for performance optimization.
17	• User management in SQL, including creating and managing database users, user privileges, and user groups.
18	END SEMESTER EXAMS

Recommended Books

1. Database Systems: A Practical Approach to Design, Implementation, and Management, 6th Edition by Thomas Connolly and Carolyn Begg
2. Database Systems: The Complete Book, 2nd Edition by Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom
3. Database System Concepts, 6th Edition by Avi Silberschatz, Henry F. Korth and S. Sudarshan.
4. Database Management Systems, 3rd Edition by Raghu Ramakrishnan, Johannes Gehrke

Digital Logic Design
CCC-131

Program-Discipline	BS – Computer Sciences
Credit Hours	3 (2+1)
Duration	18 Weeks

Course Title: Digital Logic Design**Course Code:** CCC-131**Course Description**

The course introduces the concept of digital logic, gates and the digital circuits. Further, it focuses on the design and analysis combinational and sequential circuits. It also serves to familiarize the student with the logic design of basic computer hardware components. This course provides a foundational understanding of digital logic, gates, and digital circuits, with a focus on the design and analysis of both combinational and sequential circuits. Students will acquire knowledge related to the concepts, tools, and techniques necessary for the design of digital electronic circuits. Emphasis is placed on practical skills in designing and analyzing circuits using various techniques, along with the ability to simulate and implement small-scale digital circuits.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	<u>Acquire</u> knowledge related to the concepts, tools and techniques for the design of digital electronic circuits.
CLO-2	Demonstrate the skills to <u>design</u> and analyze both combinational and sequential circuits using a variety of techniques.
CLO-3	<u>Apply</u> the acquired knowledge to simulate and implement small-scale digital circuits.
CLO-4	<u>Understand</u> the relationship between abstract logic characterizations and practical electrical implementations.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

Practical / Lab Courses

Exam		Weightage
(a)	End-Semester Exam	30
(b)	Mid-Semester Exam	20
(c)	Experiment/Lab Reports / Viva Voce / Project / PBL (Problem Based Learning)	50
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. 3x16 = 48 contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	Introduction to different number systems (binary, octal, decimal, hexadecimal) and basic logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR).
2	Basics of Boolean algebra, DeMorgan's theorem
3	Simplification of Boolean expressions
4	Techniques for simplifying Boolean functions: Karnaugh maps (KMap)
5	Quine-McCluskey method.
6	Binary Arithmetic and Arithmetic Circuits, Binary addition, subtraction, multiplication, division.
7	combinational logic circuits: adders, subtractors, multiplexer, De Multiplexers
8	Encoders, Decoders
9	MID TERM EXAMS
10	Sequential Circuits: Introduction to Latches and Flipflops,
11	SR, D, JK & T Flip Flop
12	Asynchronous and Synchronous counters, Differences between asynchronous and synchronous counters,
13	Types of counters (up, down, decade).
14	Shift Registers, Types of shift registers, their operations, and applications in digital systems
15	Memory Elements, Types of memory elements (RAM, ROM, EEPROM), their structure, and functioning

16	• Introduction to Verilog.
17	• Introduction Programmable Logic Devices (CPLD, FPGA), Differences between CPLD and FPGA, and their applications.
18	END SEMESTER EXAMS

Lab sessions are aligned with theory lectures. As new concepts are covered in lectures, they will be practiced in the lab to reinforce understanding and enhance skills. Reviewing lecture topics before each lab session is recommended for effective practice.

Week Wise Course Outline (Lab)

Week	Contents
1	● Introduction to Logic Gates – Implementation of (AND, OR, NOT)
2	● Introduction to Logic Gates – Implementation of (NAND, NOR).
3	● Introduction to Logic Gates – Implementation of (XOR, XNOR)
4	● Design and Implementation of Boolean Expressions using Logic Gates.
5	● Implementation of Combinational Circuits – Encoders & Decoders.
6	● Implementation of Combinational Circuits – Multiplexer & Demultiplexer.
7	● Arithmetic Circuits – Implementation of Binary Adders and Subtractors.
8	● Arithmetic Circuits – Design and Implementation of Half Adders and Full Adders.
9	MID TERM EXAMS
10	● Hands-on Practice and Troubleshooting in Combinational Circuits.
11	● Practical Applications of Encoders, Decoders, Multiplexers, and Demultiplexers in ALU Design.
12	● Introduction to Flip-Flops (SR, D) – Design and Implementation.
13	● Design and Implementation of JK and T Flip-Flops.
14	● Implementation of Ripple Counters – Design, Working, and Applications.
15	● Implementation of Synchronous Counters – Design, Working, and Applications.
16	● Implementation of Up/Down and Decade Counters – Design, Working, and Applications.
17	● Registers – Design and Implementation of Shift Registers.
18	END SEMESTER EXAMS

Recommended Books

1. Digital Fundamentals by Floyd, 11/e.
2. Fundamental of Digital Logic with Verilog Design, Stephen Brown, 2/e

Pre-Mathematics-II
MTD-112

Program-Discipline	BS – Computer Science
Credit Hours	3 (3+0)
Duration	18 Weeks

Course Title: ***Pre-Mathematics-II**Course Code:** MTD-112**Course Description**

This course is only for those students who have not studied Mathematics of intermediate level. This course empowers students with advanced mathematical proficiency. Students will delve into fundamental concepts such as functions, limits, differentiation, and integration, fostering a comprehensive grasp of essential mathematical tools. The curriculum extends to cover plane analytic geometry, conics, differential equations, partial differentiation, and numerical methods, providing students with a robust skill set for critical thinking and effective problem-solving in advanced mathematical applications.

Course Learning Outcomes (CLOs)

Upon successful completion of the course, the student will be able to:

CLO No.	CLO Description
CLO-1	Explore and apply the concepts of functions and limits.
CLO-2	Demonstrate proficiency in applying various mathematical techniques such as differentiation techniques, integration rules, chain rule and trigonometric functions.
CLO-3	Solve differential equations.

Weightage of Exams

Theory Subjects (May Include Practical / Lab Element)

Exam		Weightage
(a)	End-Semester Exam	50
(b)	Mid-Semester Exam	30
(c)	Quiz / assignment*	20
(d)	Practical / Lab / Projects	
(e)	Class Participation	
Total		100

*One Quiz and One Assignment per Semester is mandatory. More than One Quiz/Assignment may be taken and average or the best score shall be credited in such case.

One (01) Credit Hour of Theory is equivalent to One (01) contact hour per week i.e. One Hour teaching per Week. In the semester of 16 weeks of teaching, 3 Credit Hours of Theory Course means (3x16) 48 contact hours in the semester.

In the semester of 16 weeks of teaching, one (01) Credit Hour of Lab is equivalent to 3 contact hours per week for 16 weeks i.e. $3 \times 16 = 48$ contact hours in the semester.

Week Wise Course Outline

Week	Contents
1	• FUNCTIONS AND LIMITS: Functions, Composition of Functions, Inverse of Composition of Functions, Transcendental Functions, Graphical Representations.
2	• Limit of a Function, Important Limits, Continuous and Discontinuous Functions.
3	• DIFFERENTIATION: Derivative of a Function, Theorems on Differentiation, Application of Theorems on Differentiation, Chain Rule.
4	• DIFFERENTIATION: Differentiation of Trigonometric and Inverse Trigonometric Functions,
5	• Differentiation of Exponential and Logarithmic Functions, Differentiation of Hyperbolic and Inverse Hyperbolic Functions. • HIGHER ORDER DERIVATIVES AND APPLICATIONS: Higher Order Derivatives, Maclaurin's and Taylor's Expansions.
6	• Application of Derivatives, Maxima and Minima.
7	• INTEGRATION: Introduction, Rules of Integration, Integration by Substitution.
8	• Integration by Parts, Integration using Partial Fractions, Definite Integrals.
9	MID TERM EXAMS
10	• PLANE ANALYTIC GEOMETRY – STRAIGHT LINE: Division of a Line Segment, Slope of a Straight Line, Equation of a Straight Line Parallel to Co-ordinate Axes. Standard Form of Equation of a Straight Line.

11	Distance of a Point from a Line, Angle Between Lines, Concurrency of Straight Lines, Area of a Triangular Region, Homogenous Equation.
12	CONICS: Introduction, Circle, Equation of a Circle, General Form of an Equation of a Circle.
13	Standard Form of Equation of Parabola. Tangent and Normal to Parabola
14	Standard Form of Equation of an Ellipse and Hyperbola. Tangent and Normal to Ellipse and Hyperbola
15	DIFFERENTIAL EQUATIONS: Introduction, Formation of Differential Equations, Solution of Differential Equation.
16	PARTIAL DIFFERENTIATION: Differentiation of Function of Two Variables, Euler's Theorem.
17	INTRODUCTION TO NUMERICAL METHODS: Numerical Solution of Non-linear Equations, Numerical Quadrature.
18	END SEMESTER EXAMS

Recommended Book

1. A Textbook of Mathematics for class XII National Book Foundation, Islamabad.