KG COLLEGE OF ARTS AND SCIENCE
Autonomous Institution | Affiliated to Bharathiar University
Accredited with A++ Grade by NAAC
ISO 9001:2015 Certified Institution
KGiSL Campus, Saravanampatti, Coimbatore – 641 035

Regulations 2025-26 for Postgraduate Programme

**Learning Outcomes Based Curriculum Framework (LOCF) model with
Choice Based Credit System (CBCS)**

Programme: M.Sc. Software Systems (M.Sc. SS)
Programme Code: MSS

(Applicable for the Students admitted during the Academic Year 2025-26 onwards)

Eligibility

The student should have passed Higher Secondary Examination with Mathematics / Business Mathematics / Applied Mathematics. (As per the eligibility condition given by Bharathiar University Ref. BU/R/B3-B4/ Eligibility Condition /2025/7960 dated 08/05/2025).

Program Learning Outcomes (PLOs)

The successful completion of the M.Sc. Software Systems programme shall enable the students to:

PLO1	Assimilate technical concepts well to contribute code reviews and meet modern demands effectively in the area of Artificial Intelligence and Machine Learning.
PLO2	Develop skills for effective leadership in IT support, Network Architect, Web Developer and successful Entrepreneur as well.
PLO3	Use logical skills, analytical skills and programming skills relevant to Full Stack Development and DB Administration.
PLO4	Creatively use the knowledge in computational science, mathematics and statistics for Data Analysis, Data Science and Business Analysis to solve real world problems.
PLO5	Engage in lifelong learning with ethical principles for the betterment of self as well as society.

M.Sc. Software Systems
Distribution of Credits and Hours for all the Semesters

Part	Course Category	No. of Courses	Hours		Credits	Total Credits		Semester
I	Language-I	4	4 X 3	12	2 X 3	12	12	1 - 4
II	Language-II	4	4 X 3	12	2 X 3	12	12	1 - 4
III	Core Theory (6 hrs./week)	2	2 X 6	12	2 X 4	8	200	3
	Core Theory (5 hrs./week)	12	12 X 5	60	12 X 4	48		1 – 3, 5 - 9
	Core Theory (4 hrs./week)	9	9 X 4	36	9 X 4	36		4 - 9
	Core Practical (4 hrs./week)	16	16 X 4	64	16 X 3	48		1 - 9
	Allied (4 hrs./week)	4	4 X 4	16	4 X 3	12		1 - 4
	Elective (4 hrs./week)	3	3 X 4	12	3 X 4	12		5, 6, 8
	Project Work and Internship	2	-	-	2 X 13	26		7 & 10
	Skill Enhancement Course (SEC) Theory	2	2 X 4	8	2 X 4	8		5 & 9
	Skill Enhancement Course (SEC) Lab	1	1 X 2	2	1 X 2	2		4
IV	Ability Enhancement Compulsory Course (AECC)	3	3 X 2	6	3 X 2	6	6	1, 2, 4
	Ability Enhancement Compulsory Course (AECC) Online Course MOOC	1	-	-	1 X 2	2	2	3
	Foundation Course (FC)	1	-	-	1 X 2	2	2	3
Total		**64**		**240**		**234**	**234**	

Consolidated Semester wise and Component wise
Hours and Credits distribution

Semester	Part I		Part II		Part III		Part IV		Total	
	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	**Hrs.**	**Credits**
1	3	3	3	3	22	17	2	2	**30**	**25**
2	3	3	3	3	22	17	2	2	**30**	**25**
3	3	3	3	3	24	17	-	4	**30**	**27**
4	3	3	3	3	22	19	2	2	**30**	**27**
5	-	-	-	-	30	26	-	-	**30**	**26**
6	-	-	-	-	30	26	-	-	**30**	**26**
7	-	-	-	-	-	13	-	-	**-**	**13**
8	-	-	-	-	30	26	-	-	**30**	**26**
9	-	-	-	-	30	26	-	-	**30**	**26**
10	-	-	-	-	-	13	-	-	**-**	**13**
Total	**12**	**12**	**12**	**12**	**210**	**200**	**6**	**10**	**240**	**234**

Semester – 1

Curriculum

M.Sc. Software Systems

Course Code	Part	Course Category	Course Name	Hours/ Week	Duration in hrs.	CIA	ESE	Total	Credits
Semester – 1									
25TAM11L	I	Language – I	Tamil – I	3	3	25	75	100	3
25HIN11L			Hindi – I						
25MAL11L			Malayalam – I						
25FRE11L			French – I						
25ENG12L	II	Language –II	English – I	3	3	25	75	100	3
25MSS13C	III	Core – I	C Programming	5	3	25	75	100	4
25MSS14P	III	Core Lab -I	C Programming Lab	4	3	40	60	100	3
25MSS15C	III	Core – II	Digital Electronics and Microprocessor	5	3	25	75	100	4
25MSS16P	III	Core Lab-II	Python and Big Data Fundamentals Lab	4	3	40	60	100	3
25MSS17A	III	Allied – I	Numerical Analysis	4	3	25	75	100	3
25SOF1AE	IV	AECC - I	Soft Skills	2	2	-	50	50	2
Total				**30**				**750**	**25**

Course Code	Course Name	Category	Hours / Week	Credits
25TAM11L	**Tamil – I**	**Language – I**	**4**	**3**

Course Objectives

- இலக்கிய வளர்ச்சியை அறிந்து கொள்ளுதல்
- இலக்கியம் படைக்கும் திறன்
- இலக்கிய இலக்கண உரைசெய்தல்
- திறனாய்வு முறையினைக் கற்றுத்தேர்தல்

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	புதுக்கவிதையின் மூலம் வாழ்வியல் விழுமியங்களை உணர்ந்து கொள்ளுதல்.	K1, K2
CLO2	சிறந்த மற்றும் வாழும் கவிஞர்களை அறிந்து கொள்ளுதல்.	K2, K3
CLO3	சிறந்த படைப்பாளர்களின் சிறுகதையில் வெளிப்படும் சமூகச் சிந்தனைகளை அறிந்து விழிப்புணர்வைப் பெறுதல்.	K3
CLO4	தற்கால இலக்கியங்களான புதுக்கவிதை, சிறுகதை தோன்றி வளர்ந்த பின்புலத்தை அறிதல்.	K1, K3
CLO5	மொழியைப் பிழையின்றி பேச எழுத கற்கத் தேவையான தமிழ் இலக்கணத்தின் இன்றியமையாமையை உணர்தல். நடைமுறை வாழ்வியலுக்குத் தேவைப்படும் ஆங்கிலக் கடிதத்தைத் தமிழாக்கம் செய்தலுக்கான பயிற்சி அடைதல்.	K2, K3
K1 - Remember**; K2 -** Understand**; K3 –** Apply.		

Part – I: Tamil – I

Unit	Content	No. of Hours
I	நாட்டுப்பற்று 1. உலகத்தை நோக்கி வினவுதல் - பாரதியார் 2. பாரதிதாசன் கவிதைகள் - பாரதிதாசன் • தமிழ்ப்பேறு 3. ஒற்றுமையே உயிர்நிலை - நாமக்கல் கவிஞர் 4. தேவதேவன் கவிதைகள் - தேவதேவன் • சாலையும் மரங்களும் செருப்பும் • புதிய வீடு 5. ஆலாபனை - கவிக்கோ அப்துல் ரகுமான் • போட்டி • பாதை 6. புத்தகச் சந்தை - கவிஞர் வாலி	14
II	சமூகம் 1. எட்டாவது சீர்........ - ஈரோடு தமிழன்பன் 2. தொலைந்து போனேன் - கவிஞர் தாமரை 3. திருநங்கைகள் காகிதப் பூக்கள் - நா. காமராசன் 4. மரங்களைப் பாடுவேன் - வைரமுத்து 5. புள்ளிப் பூக்கள் (ஹைக்கூ) - அமுத பாரதி 6. நாட்டுப்புறப் பாடல்கள் (தாலாட்டுப் பாடல் , தெம்மாங்குப் பாடல் , உழவுத்தொழில்)	14
III	சிறுகதை 1. காஞ்சனை - புதுமைப்பித்தன் 2. சுமைதாங்கி - ஜெயகாந்தன் 3. சோற்றுக் கணக்கு - ஜெயமோகன் **4.** ஆறு யானைகள் - எஸ்.ராமகிருஷ்ணன் **5.** மரத்தைக் கர்ப்பம் சுமந்தவள் - ஆண்டாள் பிரியதர்சினி	12

Unit	Content	No. of Hours
IV	**இலக்கிய வரலாறு** 1. மரபுக்கவிதையின் தோற்றமும் வளர்ச்சியும் 2. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் 3. ஹைக்கூ கவிதையின் தோற்றமும் வளர்ச்சியும் 4. சிறுகதையின் தோற்றமும் வளர்ச்சியும்	10
V	**இலக்கணம்** 1. எழுத்துகள் (முதல் எழுத்துகள், சார்பெழுத்துகள்) 2. எழுத்துக்களின் பிறப்பு 3. மாத்திரைகள் 4. பயிற்சிக்குரியன - மொழிபெயர்ப்பு (ஆங்கிலத்திலிருந்து தமிழுக்கு மொழிபெயர்த்தல்)	10
	Total Hours	**60**

	Reference Books
1	பேரா. குருசாமி, ம.ரா.போ. (2014), பாரதி பாடல்கள், ஆய்வுப் பாதிப்பு, தமிழ்ப் பல்கலைக் கழகம், தஞ்சாவூர்.
2	அப்துல் ரகுமான்,(2000), ஆலாபனை, கவிக்கோ பதிப்பகம்
3	தாமரை கவிதைகள், (2012), நியூ செஞ்சுரி புக் ஹவுஸ்
4	வரதராசனார் மு, (2021), தமிழ் இலக்கிய வரலாறு, சாகித்ய அகாடமி பதிப்பு.
5	முனைவர் பஞ்சாங்கம் கா, (2017), தமிழ் இலக்கிய வரலாறு, காவ்யா பதிப்பகம்.
6	முனைவர் வேங்கடராமன் கா. கோ (2008), தமிழ் இலக்கிய வரலாறு, கலையக வெளியீடு.
7	பரந்தாமனார் அ.கி. (2002), நல்ல தமிழ் எழுத வேண்டுமா?, அல்லி நிலையம்.
8	ராமகிருஷ்ணன் எஸ் (2006), 100 சிறந்த சிறுகதைகள் (தொகுதி 1 & 2) பதிப்பகம்: தேசாந்திரி பதிப்பகம்
9.	குமரன் கோ (2010), தமிழ் இலக்கணம் எளிய அறிமுகம் , சந்தியா பதிப்பகம்
10	சக்திவேல் சு,(2012), நாட்டுப்புறவியல், மணிவாசகர் பதிப்பகம்

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Question Pattern

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காலம் : 3 மணி நேரம்	மொத்த மதிப்பெண்கள் : 75

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பிரிவு – அ   10x1=10

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- சரியான விடையைத் தேர்ந்தெடுத்து எழுதுக.

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பிரிவு – ஆ   5x5=25

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- செய்யுள்   -   1 வினா
- செய்யுள்   -   1 வினா
- சிறுகதை   -   1 வினா
- இலக்கிய வரலாறு   -   1 வினா
- இலக்கணம்   -   1 வினா

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பிரிவு – இ   5x8=40

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- செய்யுள்   -   1 வினா
- செய்யுள்   -   1 வினா
- சிறுகதை   -   1 வினா
- இலக்கிய வரலாறு   -   1 வினா
- மொழிபெயர்ப்பு   -   1 வினா

குறிப்பு :   ஆ, இ பிரிவுகளில் வினாக்கள் "இது" அல்லது "அது" என்ற வகையில் அந்தந்த

அலகுகளிலிருந்து அமைத்தல் வேண்டும்.

Course Code	Course Name	Category	Hours / Week	Credits
25HIN11L	**Hindi - I**	**Language – I**	**4**	**3**

Course Objectives

- Improves grammatical knowledge
- Will continue to read and learn about articles and think about them
- It is possible to read and understand short stories and understand the thoughts and life of the people of this state
- Translation knowledge and the ability to read and analyze a message are also available

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	Course Outcome	Knowledge Level
CLO1	Understand the text styles and grammatical elements	K1, K2
CLO2	Discuss the content of a reading passage	K2, K3
CLO3	Develop an interest in the appreciation of short stories	K3
CLO4	Comprehend the grammatical structures and sentence making	K1, K3
CLO5	Understand the language and developing English to Hindi translation skill	K2, K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

CLO - PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	3	2	2	2
CLO2	2	3	2	2	2
CLO3	2	2	3	3	2
CLO4	3	2	2	3	3
CLO5	2	3	3	2	2
3 - Substantial (High)		2 - Moderate (Medium)		1 - Slight (Low)	

Language – I: Hindi – I

Unit	Content	Hours
I	**Prose : Nuthan Gadya Sangrah** Lesson 1 – Bharathiya Sanskurthi - Dr.Rajendra Prasad Lesson 3 – Razia - Ramaviksha Benipuri Lesson 4 – Makreal - Yespal Lesson 5 – Bahtha Pani Nirmala -'Ageya' Lesson 6 – Rashtrapitha Mahathma Gandhi - Mukthibodh Lesson 9 – Ninda Ras - Harishankar Parsayi.	14
II	**Non Detailed Text Short Stories: Kahani Kunj** Pareksha - Premchand Mamtha - Jayashankar Prasad Apna paraya - Jaynendrakumar Admi ka bachcha - Yespal Bolaram ka jeev - Harishankar Parsayi Vapasi - Mannu Bhandari	14
III	**Grammar: Shabdha Vichar Only** (Noun, Pronoun, Adjective, Verb, Tense, Case, Endings) Theoretical & Applied.	12
IV	**Translation: English – Hindi Only.** Anuvadh Abhyas – Iii (1-15 Lessons Only)	10
V	**Comprehension**: 1 Passage From Anuvadh Abhyas–III (16-30)	10
	TOTAL	**60**

Text Books

1	Jayaprakash, (2009), Nuthan Gadya Sangrah, Publisher : Sumitra Prakashan Sumitravas, 16/4, Hastings Road, Allahabad – 211001.
2	Amithab. V.P. (2011), Kahani Kunj, Publisher : Govind Prakashan Sadhar Bagaar, Mathura, Uttar Pradesh,–281 001

Course Code	Course Name	Category	Hours / Week	Credits
25MAL11L	**Malayalam - I**	**Language – I**	**4**	**3**

Course Objectives

- Improves grammatical knowledge

- Will continue to read and learn about articles and think about them

- It is possible to read and understand short stories and understand the thoughts and life of the people of this state

- Translation knowledge and the ability to read and analyze a message are also available

- Translation knowledge and the ability to read and analyze a message are also

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Understand the text styles and grammatical elements	K1
CLO2	Discuss the content of a reading passage	K1
CLO3	Develop an interest in the appreciation of short stories	K2
CLO4	Comprehend the grammatical structures and sentence making	K3
CLO5	Understand the language and developing English to Malayalam translation skill	K4
K1 - Remember; **K2** - Understand; **K3** - Apply		

CLO - PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	3	2	2	2
CLO2	2	3	2	2	2
CLO3	2	2	3	3	2
CLO4	3	2	2	3	3
CLO5	2	3	3	2	2
3 - Substantial (High)		2 - Moderate (Medium)		1 - Slight (Low)	

Language – I: Malayalam – I

Unit	Content	Hours
I	Novel – Pathummayude Aadu - Vaikam Muhammed Basheer	14
II	Novel- - Pathummayude Aadu - Vaikam Muhammed Basheer	14
III	Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil)	12
IV	Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil)	10
V	Composition & Translation(English to Malayalam)	10
	Total Hours	**60**

Text Books	
1	Vaikam Muhammed Basheer, (2012), Novel- PathummayudeAadu, D.C.Books, Kottayam, Kerala
2	Akbar Kakkattil, (2009), Short Story - Ente Priyappeta Kadhakal
Reference Books	
1	Tharakan K.M , (2016), Malayala Novel SahithyaCharitram, N.B.S.Kottayam.
2	Achuyuthan M, (2014), Cherukatha Innale Innu-M.Achuyuthan D.C Books, Kottayam.
3	Dr George K.M,(2011) Sahithya CharitramPrasthanangalilude, D.C.Books Kottayam.
4	Sukumar Azheekode, (2015), Malayala Sahithyavimarsam, D.C.Books

Course Code	Course Name	Category	Hours / Week	Credits
25FRE11L	**French - I**	**Language – I**	**4**	**3**

Course Objective

To understand, speak, read and write simple, standard speech which is very slow and is carefully articulated and can recognize familiar words and very basic phrases concerning themselves, their family and immediate concrete surroundings when people speak slowly and clearly.

Course Outcomes

On the successful completion of the course, students will be able to

CLO	Course Outcome	Knowledge Level
CLO1	Comprehend basic vocabulary	K1
CLO2	Understand basic syntax and grammar patterns	K2
CLO3	Converse slowly in known situations	K2
CLO4	Translate small basic sentences	K3
K1 - Remember; K2 - Understand; K3 - Apply		

Language – I: French – I

Unit	Content	Hours
I	Etape 0	14
	Etape1 (Lecons 1 - 3)	
II	Etape2 (Lecons 1 - 3)	14
III	Etape 3 - Leçons 1 - 2	12
IV	Etape 3 – Leçon 3	10
	Etape 4 – Leçon 1	
V	Etape 4 – Leçons 2 - 3	10
Total		**60**

Text Book	
1	Céline Himber, Corina Brillant, Sophie Erlich, (2008), Adomania 1 – Methode de francais, Publisher - Hachette Fle.

Reference Book	
1	Yves Loiseau, Régine, (2014), Latitudes 1, Merieux Publisher: French and European Publications Inc.

Course Code	Course Name	Category	Hours /Week	Credits
25ENG12L	**English - I**	**Language II**	**4**	**3**

Course Objectives

The course intends to cover

- Various genres of literature.
- Active and passive vocabulary.
- Usage of Grammar and Communication.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Identify aesthetic sense and appreciate poetry, enhancing creativity and understanding relevant to professional environments.	K1
CLO2	Understand diverse styles of prose, facilitating versatility in writing and inculcating interpersonal skills.	K2
CLO3	Apply the characters and the narrative techniques in creative writing and content creation ethically.	K3
CLO4	Employ vocabulary and grammatical proficiency in communication to enhance clarity in workplace interactions.	K3
CLO5	Enhance overall communication competence. Practicing these skills in combination reinforces learning and provides students with opportunities to use the language in authentic contexts.	K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Language - II: English – I

Unit	Content	No. of Hours
I	**Poetry** : Nature 1. I Wandered Lonely as a Cloud - William Wordsworth 2. The Sparrow - Paul Laurence Dunbar 3. Stopping by woods on a snowy Evening – Robert Frost	12
II	**Prose** : Friendship 1. The Man in Black - Oliver Goldsmith 2. Of Friendship - Francis Bacon 3. The Blessing of Friends - Sir John Lubbock	12
III	**Short Stories:** Morality 1. The Necklace – Guy de Maupassant 2. The Lottery - Shirley Jackson 3. The Monkey's Paw - W. W. Jacobs	12
IV	**Language Competency** 1. Vocabulary : Synonyms, Antonyms, Word Formation 2. Parts of Speech 3. Error correction	12
V	**English for Communication** 1. Listening for General and Specific Information. 2. Self - Introduction, Introducing others, Greetings. 3. Reading a prose passage, Reading a poem and Reading a short story 4. Descriptive writing – Writing a short descriptive essay of two to three paragraphs.	12
	Total Hours	**60**

Text Books

1.	Zama, M. (2004). Poetry Down the Ages. Orient Blackswan.
2.	Goldsmith, O. (1869). The Works of Oliver Goldsmith. J. Dicks
3.	Bacon, F., & Montagu, B. (1857). The Works of Francis Bacon (Vol. 1). Parry & McMillan.

Reference Books

1.	Kumar,V. T. Bhavani, Durga.K. Srinivas.YL. (2018). English in use - A textbook for College Students. (English, Paperback).
2.	Swan, M. (2005). Practical english usage (Vol. 7). Oxford: Oxford university press.

Web Resources (Swayam / NPTEL)

1.	https://nptel.ac.in/courses/109105205

Course Code	Course Name	Category	Hours / Week	Credits
25MSS13C	**C Programming**	**Core - I**	**5**	**4**

Course Objectives

This course intends to cover:
- Basics of C Programming.
- Real world problems using control structures, arrays, functions and pointers.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Recite the basics of programming languages.	K1
CLO2	Understand the concepts of variables, expressions, control structures, arrays and strings.	K2
CLO3	Infer the concept of functions, structures and union.	K3
CLO4	Apply the concepts of pointers.	K3
CLO5	Explore the BIOS and DOS Interrupts.	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze		

CLO – PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	2	2	3	2	2
CLO2	2	3	3	3	2
CLO3	3	3	3	3	2
CLO4	3	3	3	3	2
CLO5	2	2	3	2	2
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core – I : C Programming

Unit	Content	No. of Hours
I	**Programming Languages:** Planning the Computer Program **–** Flow Chart – Types of Logic used in Flowchart – Computer Languages – Classification of Programming Languages – Popular Programming Languages – Program development process – Characteristics of a Good Program – Program Development Environment - Error in Programming. Problem Solving: Introduction – Analyzing and defining the problem.	16
II	**Overview of C:** An overview of C – Data types and sizes – Declarations – Variables – Constants – Operators – Expressions Formatted and Unformatted Input / Output statements - Program Control Structures – Loop Control Structures – Arrays – Strings.	15
III	**Functions:** Introduction- Function Arguments – Function Prototype – Recursion – Storage Classes. Structures and Union**:** Structures –Array of Structures-Unions–Self - Referential Structures – Dynamic Memory Allocation.	15
IV	**Pointers:** Pointers – Introduction – Pointers and Arrays – Pointers and Strings – Pointers and Functions - Pointers and Structures.	14
V	**File processing**: Basic methods for FILE - Sequential Files – Random Access Files – C Preprocessors – Command Line Arguments – File Pointers and Navigation – Temporary Files - Working with multiple files - Error Handling in File Operations – Simple Text Editor.	15
	Total Hours	75

Text Books

1	Balagurusamy.E, (2024), Programming in ANSI C, 9th Edition, Tata McGraw Hill.
2	Yeswanth P Kanetkar, (2022), Let us C, 19th Edition, BPB Publications.

Reference Books

1	Deitel & Deitel, (2022), C How to Program, 9th Edition, PHI/Pearson Education Asia.
2	Balagurusamy E, (2017), Computing Fundamentals and C Programming, 2nd Edition, McGraw Hill.
3	Ashok N.Kamthane, (2006), Programming with ANSI and Turbo C, Pearson Education Asia.
4	Yeswanth P Kanetkar, (1995), Writing TSR through C, BPB Publication.

Web Resources (Swayam, NPTEL)

1	https://onlinecourses.nptel.ac.in/noc24_cs02/preview
2	https://onlinecourses.swayam2.ac.in/cec20_cs02/preview

Course Code	Course Name	Category	Hours / Week	Credits
25MSS14P	**C Programming Lab**	**Core Lab - I**	**4**	**3**

S. No.	List of Programs
1	Basic programs in C.
2	Find the sum, average, standard deviation for a given set of numbers.
3	Develop a program using control structures.
4	Develop a program using loop.
5	Program to print magic square using relational operators.
6	Develop a program to sort the given set of numbers in ascending order using arrays.
7	Check whether the given string is a palindrome or not using pointers.
8	Develop a program to find the length of string using pointers.
9	Develop a program to compare two strings using pointers
10	Develop a program to count the number of vowels in the given sentence using loop.
11	Develop a program using recursive function.
12	Print the students Mark sheet assuming roll no, name, and marks in 5 subjects in a structure. Create an array of structures and print the mark sheet in the university pattern.
13	Function using pointers to add two matrices and to return the resultant matrix to the calling functions.
14	Develop a program which receives two filenames as arguments and check whether the file contents are same or not. If same delete the second file.
15	Develop a program which takes a file as command line argument and copy it to another file. At the end of the second file write the total i) no of chars ii) no. of words and iii) no. of lines.
16	Perform basic operations using Github platform.
	Total Hours **60**

Text Books

1	Balagurusamy.E, (2024), Programming in ANSI C, 9th Edition, Tata McGraw Hill.
2	Yeswanth P Kanetkar, (2022), Let us C, 19th Edition, BPB Publications.

Reference Books

1	Deitel & Deitel (2022), C How to Program, 9th Edition, PHI/Pearson Education Asia.
2	Balagurusamy.E, (2019), Programming in ANSI C, 8th Edition, Tata McGraw Hill.
3	Ashok N.Kamthane, (2006), Programming with ANSI and Turbo C, Pearson Education Asia.

Web Resources (Swayam / NPTEL)

1	https://onlinecourses.nptel.ac.in/noc24_cs02/preview
2	https://onlinecourses.swayam2.ac.in/cec20_cs02/preview

Course Code	Course Name	Category	Hours / Week	Credits
25MSS15C	**Digital Electronics and Microprocessor**	**Core - II**	**5**	**4**

Course Objectives

The course intends to cover:

- Principles of digital electronics, binary numbers, boolean algebra, logic gates and truth tables.
- Combinational logic circuits, complex logic circuits, multiplexers and decoders.
- Architecture and operation of the 8085 microprocessors.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Identify and summarize the basic characteristics of various number systems and logic gates.	K1, K2
CLO2	Explain the functionalities of basic combinational circuits like half adders, full adders, subtractors, multiplexers, and demultiplexers.	K2
CLO3	Analyze the operation and functionality of various sequential circuits like flip-flops, counters, and shift registers.	K4
CLO4	Identify the functional units of the 8085 architecture and explain the basic concepts of 8085 operation, including instruction and data formats, addressing modes, and machine cycles.	K1, K2
CLO5	Apply their knowledge of 8085 microprocessor to interface with external devices and develop basic programs to control their operation.	K3
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze		

CLO-PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	2	3	-	2	2
CLO2	3	3	-	2	-
CLO3	3	2	2	1	1
CLO4	2	2	2	2	1
CLO5	3	2	3	2	2
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Core - II: Digital Electronics and Microprocessor

Unit	Content	No. of Hours
I	**Number System and Logic Gates:** Number systems: Binary, Decimal, Octal and Hexadecimal – Conversions: Decimal to Binary, Octal, Hexadecimal conversions - Binary to Decimal, Octal, Hexadecimal conversions - Octal to Binary, Decimal, Hexadecimal conversions - Hexadecimal to Binary, Decimal, Octal conversions - Binary Addition, Binary Subtraction - One's and Two's Complements Representation. Logic Gates: AND, OR, NOT, NAND, NOR, and EX-OR.	15
II	**Combinational Circuits:** Boolean algebra - Basic Laws – Demorgan's Laws - K-map representation: SOP and POS - Simplification of logic functions using K-map, Don't care conditions. Half Adder – Full Adder- Half Subtractor – Full Subtractor – Multiplexer: 4x1 MUX, 8x1 MUX – Demultiplexer: 1x4 DEMUX, 1x8 DEMUX - Encoders: 4x2 and 8x3 – Decoders: 2x4 and 3x8	15
III	**Sequential Circuits:** RS flip flop, Clocked RS Flip Flop – JK Flip Flop – JK Master Slave Flip Flop - D Flip Flop - T Flip Flop - Applications of Flip Flops. Counters: Asynchronous (Ripple) Mod – 3 and Mod - 5 Counter, Synchronous Mod – 3 and Mod - 5 Counter – Synchronous Up down Counter – Decade Counter - Applications of Counters.	15
IV	**8085 Microprocessors:** Pin Diagram of 8085 – Architecture of 8085 – Addressing modes – Instruction set: Data Transfer Instructions, Arithmetic Instructions, Logical Instructions, Branching Instructions, Machine control Instructions - Arithmetic and Logical Programs: Addition and Subtraction of Two 8-bit Numbers, Largest Number in an Array, Smallest Number in an Array, Arranging Numbers in an Ascending Order and Descending Order, Block Data Transfer.	15
V	**Interfacing and Applications:** Parallel communication interface (8255 PPI): 8255 Pin Diagram , 8255 Block Diagram, Modes of 8255 - Serial communication interface (8251 USART): 8251 Pin Diagram, 8251 Block Diagram, Modes of 8251- DMA controller: 8237/8257 Pin Diagram, Block Diagram – Applications: Traffic Light Control System – Water Level Control System– Temperature Measurement Control.	15
	Total Hours	**75**

Text Books	
1	Morris Mano, (2022), Computer System Architecture, 3rd Edition, Pearson Education.
2	Salivahanan S, (2012), Digital Circuits and Design, 3rd Edition, McGraw Hill Education.
3	Ramesh Gaonkar (2019), Microprocessor Architecture, Programming and Application with the 8085, 6th Edition, Pearson International Publishing.

Reference Books	
1	Puri V K (2017), Digital Electronics: Circuits and Systems, McGraw Hill Education.
2	Badri Ram (2012), Advanced Microprocessor and Interfacing, McGraw Hill Education.

Web Resources (Swayam / NPTEL)	
1	https://onlinecourses.swayam2.ac.in/cec24_cs09/preview
2	https://onlinecourses.nptel.ac.in/noc24_ee46/preview

Course Code	Course Name	Category	Hours / Week	Credits
25MSS16P	**Python and Big Data Fundamentals Lab**	**Core Lab - II**	**4**	**3**

Unit	Content	No. of Hours
I	**Python Fundamentals:** Overview – Introduction to Python Programming Language – Control Flow – Python Data Structures – Functions 1. Program to demonstrate conditional statements and loops in Python 2. Program to implement list, tuple, set, and dictionary operations 3. Program to define and invoke functions with parameters and return values	12
II	**Advanced Python:** Object-Oriented Programming – Exception Handling – File Handling – Python-SQL Connectivity 1. Program to implement a class with constructors and methods 2. Program to demonstrate exception handling using try-except blocks 3. Program to perform file read/write operations in Python 4. Program to connect Python with a SQL database and perform CRUD operations	12
III	**Hadoop & Big Data Foundations:** Big Data Overview - Characteristics of Big Data, Big Data Ecosystem, Hadoop Architecture - Components of Hadoop (HDFS, MapReduce), Data Lakes vs. Data Warehouses, Distributed Computing Principles - HDFS Design and Usage 1. Program to demonstrate file storage and retrieval in HDFS 2. Program to implement basic MapReduce logic using Word Count	12
IV	**Apache Spark and Data Processing:** Introduction to Spark - Spark Architecture, RDDs (Resilient Distributed Datasets), DataFrames - Spark SQL 1. Program to process structured data using Spark DataFrames 2. Program to perform data transformation using RDDs in PySpark	12
V	**Big Data Project Implementation:** Overview of a Big Data Project Lifecycle – Text Processing at Scale – Storage of Unstructured and Structured Data in HDFS – Performance Analysis Using Spark vs MapReduce – Real-Time vs Batch Processing Overview – Sample End-to-End Project with Reporting and Visualization 1. Program to process and analyze a large text file using Spark (Word Count) 2. Program to store and retrieve project data in HDFS 3. Program to implement a mini Big Data pipeline using PySpark 4. Program to compare execution time between local and distributed file systems	12
	Total Hours	**60**

Text Book	
1	Luciano Ramalho, (2022), Fluent Python, 2nd Edition, O'Reilly Media.
Reference Books	
1	Tom White, (2015), Hadoop: The Definitive Guide, 4th Edition, O'Reilly Media.
2	Jan Kunigk, Ian Buss, Paul Wilkinson & Lars George, (2020), Practical Data Lake Architecture, O'Reilly Media.
Web Resources (Swayam / NPTEL)	
1	https://onlinecourses.nptel.ac.in/noc22_cs32/preview
2	https://onlinecourses.nptel.ac.in/noc21_cs45/preview
3	https://onlinecourses.nptel.ac.in/noc20_cs92/preview

Course Code	Course Name	Category	Hours / Week	Credits
25MSS17A	**Numerical Analysis**	**Allied - I**	**4**	**3**

Course Objective

The course intends to cover:
- A set of strategies and approaches used to generate approximate solutions to mathematical problems that cannot be solved analytically.

Course Learning Outcomes

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Obtain numerical solutions of algebraic and transcendental equations.	K1
CLO2	Understand the numerical solutions of simultaneous linear equations using different methods.	K2
CLO3	Understand the concept of numerical solutions in differentiation of functions.	K2
CLO4	Compute the definite integrals using numerical methods.	K3
CLO5	Demonstrate the use of various numerical methods for solving first-order ordinary differential equations.	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze		

CLO-PLO Mapping

CLOs/PLOs	PLO1	PLO2	PLO3	PLO4	PLO5
CLO1	3	1	1	1	1
CLO2	2	2	2	1	2
CLO3	2	2	2	1	2
CLO4	2	2	2	1	2
CLO5	1	2	2	2	1
3 - Substantial (high)		**2** - Moderate (medium)		**1** - Slight (low)	

Allied I: Numerical Analysis

Unit	Content	No. of Hours
I	**The Solution of Numerical Algebraic and Transcendental Equations:** Bisection method – Iteration Method – Convergence condition – Regula Falsi Method – Newton - Raphson method.	12
II	**Solution of Simultaneous Linear Algebraic Equations:** Gauss Elimination Method - Gauss Jordan Method- Gauss Jacobi Method - Gauss Seidel Method**.**	12
III	**Numerical Differentiation:** Newton's Forward Difference - Newton's Backward Difference - Derivative using Stirling's formula.	12
IV	**Numerical Integration:** Newton Cote's formula- Trapezoidal rule -Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.	12
V	**Numerical Solution of First Ordinary Differential Equation:** Taylor series method - Euler's method - Modified Euler's method- Runge Kutta method (Second & fourth order Runge Kutta method only).	12
	Total Hours	**60**

Text Book	
1	P. Kandasamy, K.Thilagavathy & K. Gunavathi (2007)" Numerical methods", S. Chand and Company Ltd, New Delhi. Unit I : Chapter 3 : Section 3.1 – 3.4 Unit II : Chapter 4 : Section 4.1, 4.2, 4.8, 4.9 Unit III: Chapter 9 : Section 9.1 – 9.4 Unit IV: Chapter 9 : Section 9.7 – 9.9, 9.13, 9.14 Unit V: Chapter 11 : Section 11.5, 11.6, 11.9, 11.11- 11.13

Reference Books	
1	M.K. Venkataraman (1999), "Numerical Methods in Science and Engineering", National Publishing company.
2	K. Sankara Rao (2018), "Numerical Methods for Scientists and Engineers", Prentice Hall India.
3	S.S. Sastry (2006),"Introductory Methods of Numerical Analysis", 4th Edition, Prentice Hall of India Pvt. Ltd.

Web Resources (Swayam / NPTEL)	
1	https://archive.nptel.ac.in/courses/111/107/111107105/

Course Code	Course Name	Category	Hours / Week	Credits
25SOF1AE	**Soft Skills**	**AECC - I**	**2**	**2**

Course Objective

The course intends to cover:

- The essential soft skills that is crucial for success in today's dynamic and interconnected workplace.

Course Learning Outcome

On the successful completion of the course, students will be able to

CLO	CLO Statements	Knowledge Level
CLO1	Understand the comprehensive skills to participate actively in conversation, writing short texts with expression	K1, K2, K3
CLO2	Infer the cohesive devices to describe and discuss any objects, pictures using compound, complex sentence forms.	K2, K3
CLO3	Comprehend the logic in the given situation to organize the ideas to write formal and informal letters.	K2, K3
CLO4	Understand the given material to organize it in a logical sequence to present a paragraph with main and supporting ideas with concluding sentences.	K3
CLO5	Present valuable ideas in conversation to emulate the main ideas and key points in short essays.	K3
K1 - Remember; **K2** - Understand; **K3** - Apply		

Ability Enhancement Compulsory Course - I : Soft Skills

Module	Unit	Details	No. of Hours
		Presentation Skills	
I	1	**Getting to Know You:** Grammar: Introduction to Tenses, Everyday English, Role-Play. Reading Activity: Different ways of communication. *Activities*: Fill in the blanks (Listening), Self Introduction (Speaking).	6
	2	**My Day:** Grammar: Present simple positive & negative/Adverbs of Frequency, Vocabulary & Speaking about Daily Activities. Listening: Observe and Answer/ Telling the time. *Activities:* Reading & Writing: Describe where you live.	
	3	**Your World:** Grammar: Possessive determiners. Listening: Positive & negative contractions. Reading & Writing: Personal profile. *Activities:* Talk about countries, nationalities (Vocabulary & Speaking).	
	4	**The World of Work:** Grammar: Yes/No & Wh Questions. Vocabulary & Speaking: Jobs. Listening: Recognize the schwa sound. *Activities:* Opening and closing an email (Reading & Writing).	
	5	**Places and Things:** Grammar: There is / there are, articles. Vocabulary & Speaking: Talk about rooms & furniture. Listening: Directions. Reading & Writing: Imperatives.	
	6	**24 Hours:** Grammar: Likes & Dislikes. Vocabulary & Speaking: Speak about hobbies and interests. Reading: Match the photos with descriptions. Writing: Write complete sentence using prompt. *Activities:* Observe & answer *(Listening).*	
		Practice: Listening & Speaking Presentations - Talking about how you learn – Understanding key information in a presentation – Writing sentences about you.	
II		**Confidence**	
	1	**Clothes and Shopping:** Grammar: Modal verbs/Adverbs of Frequency/Adjectives and Adverbs. Vocabulary & Speaking: Shopping. Reading & Writing: Product Review. *Activities:* Observe & answer *(Listening).*	6
	2	**Travel & Transport:** Grammar: Past simple questions. Vocabulary & Speaking: Talk about holidays. Listening: At the train station. *Activities:* Email - A perfect holiday (Reading & Writing).	
	3	**Health & Fitness:** Grammar: Past simple irregular verbs; Listening: Listen & Answer; Reading & Writing: Time sequencers; *Activities:* Talk about a healthy lifestyle (Vocabulary & Speaking)	
	4	**Music:** Grammar: Present perfect simple; Vocabulary & Speaking: Survey about music; Listening: Listen two people talk about music; *Activities:* Use adjectives and create sentences (Reading)	
	5	**Let's go shopping:** Vocabulary & Speaking: Town Survey; Listening: Listen and answer; Reading & Writing: Read and match; Activities: Countable & Uncountable **(**Grammar)	
		Practice: Writing a personal statement.	

		Creativity	
III	1	**Cooking & Eating:** Grammar: Some & Any, Quantifiers. Vocabulary & Speaking about Food & Drink. *Activities* Kitchen conversation (Listening). Reading an article & answering.	6
	2	**Survival:** Grammar: Comparison of adjectives. *Activities* Describing people (Speaking and Vocabulary). Listening to an audio & Answering. Reading & Writing: Read and Answer.	
	3	**Working Together:** Grammar: Verb + Noun phrases. *Activities* Technology (Vocabulary & Speaking). Listening: Listen & Answer. Reading & Writing: Notice.	
	4	**Music:** Grammar: Present perfect simple. *Activities* Survey about music (Vocabulary & Speaking). Listen to two people talking about music (Listening). Reading: Use adjectives and create sentences.	
	5	**Culture and Arts:** Grammar: Present perfect.Vocabulary & Speaking activity: Speak on the phone. *Activities:* Listen and answer. Reading & Writing activity: Review.	
		Practice: Writing comparison sentences & paragraphs.	
IV		**Problem-Solving**	
	1	**Do's and Don'ts:** Grammar, Modal Verbs. *Activities* Roleplay (Speaking). Holidays in January (Listening). Reading an article & answering.	6
	2	**Body:** Grammar: First conditional. Vocabulary & Speaking about Personality & Appearance. *Activities* Conversations about personality (Listening), Reading & Writing: Read and Answer about your skills.	
	3	**Speed:** Grammar: Present simple passive. Vocabulary & Speaking about relationships. Listening: Listen & Answer. Reading and Error spotting.	
	4	**Work:** Grammar: Adverbs of manner. Vocabulary & Speaking about work advice. Listening: Observe & Answer; Reading: Read & check your ideas.	
		Practice: Writing argumentative and descriptive essays.	
V		**Critical Thinking**	
	1	**Influence:** Grammar: would / past habits. Listening: Sentence Correction. *Activities* Your inspiration (Speaking). Picture description (Reading).Rewrite the sentences (Writing).	6
	2	**Money:** Grammar: Second conditional. *Activities:* Radio programme (Listening). Talk about games (Speaking). Reading & Writing: Fill in the blanks.	
	3	**Things that changed the world:** Grammar: articles. *Activities* :Talk about chewing gum (Speaking & Listening). Reading & Writing: Read and write a book review.	
		Practice: Writing Emails, reports and proposals.	
		Total Hours	**30**

Components for Internal Assessment and Distribution of Marks for CIA and ESE (Theory)

Max Marks	Marks for		Components for CIA						
	CIA	ESE	CIA		Model		Attendance	Active Engagement	Total
100	25	75	Actual	Weightage	Actual	Weightage	5	5	25
			50	5	75	10			

Question Paper Pattern

Component	Duration in Hours	Section A			Section B			Section C			Total
		Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	Type of Question	No. of Questions	Marks	
CIA	2	MCQ	8	8x1=8	Either or	3	3x6=18	Either or	3	3x8=24	50
Model Exam / ESE	3	MCQ	10	10x1=10	Either or	5	5x5=25	Either or	5	5x8=40	75

Components for Internal Assessment and Distribution of Marks for CIA (Lab)

Max Marks	Marks for		Components for CIA						
	CIA	ESE	Test		Model		Experiments / Programs	Observation	Total
100	40	60	Actual	Weightage	Actual	Weightage	Marks	5	40
			50	10	60	15	10		

Examination Pattern

Component	Duration in Hours	Marks			Total Marks
		Practical Exam	Record	Weightage	
Test	2	50	-	10	50
Model	3	60	-	15	60
Experiments	-	-	-	10	10
Observation	-	-	-	05	05
Total Marks - CIA				40	40
ESE	3	50	10	-	60

Components for and Distribution of Marks for ESE (Theory) Ability Enhancement Compulsory Courses (AECC) & Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Online	MCQ	50	50x1=50