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 Undergraduate Programme

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

Programme: B.Sc. Mathematics

Programme Code: BMA

(Applicable for the Students admitted during the academic year 2025 - 26 onwards)

Eligibility

The student should have passed Higher Secondary Examination with Mathematics along with Physics and Chemistry.

(As per the eligibility conditions 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 B.Sc. Mathematics Programme shall enable the students to:

PLO1	Proficiency in programming languages coupled with expertise in computational Mathematics offers career opportunities in software industry.
PLO2	Understand the Indian Knowledge System and harness Vedic mathematics to enhance speed and accuracy in competitive exams and vitalize curiosity to lifelong learning.
PLO3	Critically think with intellectual rigor in mathematics paves the way for opportunities as/in actuarial scientist, meteorologist, banking, market research, and investment analysis.
PLO4	Pose pertinent inquiries about concepts across different branches of mathematics that nurtures a research-driven mindset focused in exploration.
PLO5	Master problem solving methodologies across various domains fosters a fertile ground for entrepreneurial triumph.

B.Sc. Mathematics
Distribution of Credits and Hours for all the Semesters

Part	Courses	No. of Courses	Hours		Credits	Total		Semester
I	Language – I	4	4 X 4	16	4 X 3	12	12	1 - 4
II	Language - II	4	4 X 4	16	4 X 3	12	12	1 – 4
III	Core Theory (6 hrs. / week)	6	6 X 6	36	6 X 4	24	100	3,6
	Core Theory (5 hrs. / week)	8	8 X 5	40	8 X 4	32		1 ,2,4 , 5
	Core Lab (5 hrs./week)	1	1 X 5	5	1 X 3	03		6
	Core Lab (4 hrs. /week)	5	5 X 4	20	5 X 2	10		1-5
	Allied	4	4 X 4	16	4 X 3	12		1-4
	Electives	1	1 X 5	5	1 X 3	3		6
		1	1 X 4	4	1 X 3	3		5
	Project	1	1 X 6	6	1 X 5	5		6
	SEC : Internship	1	-	-	1 X 2	2		5
	Skill Enhancement Courses(SEC)	3	3 X 2	6	3 X 2	6		3, 4, 6
IV	Foundation Course(FC)	2	2 X 2	4	2 X 2	4	14	1,2
	Foundation Course(FC)	1	-	-	1 X 2	2		3
	Ability Enhancement Compulsory course(AECC)	3	3 X 2	6	2	6		1 ,2, 4
	Ability Enhancement Compulsory Course(AECC)-MOOC	1	-	-	2	2		3
V	Liberal Arts (Extra-curricular and Co-curricular)	-	-	-	2	2	2	4
	Total	**46**		**180**		**140**	**140**	

Consolidated Semester wise and Component wise Hours and Credits Distribution

Semester	Part I		Part II		Part III		Part IV		Part V		Total	
	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	Hrs.	Credits	**Hrs.**	**Credits**
I	4	3	4	3	18	13	4	4	-	-	**30**	**23**
II	4	3	4	3	18	13	4	4	-	-	**30**	**23**
III	4	3	4	3	22	15	-	4	-	-	**30**	**25**
IV	4	3	4	3	20	15	2	2	-	2	**30**	**25**
V	-	-	-	-	30	23	-	-	-	-	**30**	**23**
VI	-	-	-	-	30	21	-	-	-	-	**30**	**21**
Total	**16**	**12**	**16**	**12**	**138**	**100**	**12**	**14**	**-**	**2**	**180**	**140**

Semester-1

Curriculum Framework
B.Sc. Mathematics

Semester – 1									
Course Code	**Part**	**Course Category**	**Course Name**	**Hours/ Week**	**Examination**				**Credits**
					Duration in hrs.	**Max Marks**			
						CIA	**ESE**	**Total**	
25TAM11L	I	Language - I	Tamil – I	4	3	25	75	100	3
25HIN11L	I		Hindi – I						
25MAL11L	I		Malayalam – I						
25FRE11L	I		French – I						
25ENG12L	II	Language -II	English – I	4	3	25	75	100	3
25BMA13C	III	Core - I	Classical Algebra	5	3	25	75	100	4
24BMA14C	III	Core – II	Calculus	5	3	25	75	100	4
25BMA15P	III	Core Lab I	Calculus using Scilab	4	3	40	60	100	2
25BMA16A	III	Allied – I	Statistics - I	4	3	25	75	100	3
25ENV1FC	IV	FC - I	Environmental Studies	2	2	50	-	50	2
25SOF1AE	IV	AECC - I	Soft Skills	2	2	-	50	50	2
Total				**30**				**700**	**23**

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		

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)	

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
IV	**இலக்கிய வரலாறு** 1. மரபுக்கவிதையின் தோற்றமும் வளர்ச்சியும் 2. புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும் 3. ஹைக்கூ கவிதையின் தோற்றமும் வளர்ச்சியும் 4. சிறுகதையின் தோற்றமும் வளர்ச்சியும்	10

Unit	Content	No. of Hours
V	**இலக்கணம்** 1. எழுத்துகள் (முதல் எழுத்துகள், சார்பெழுத்துகள்) 2. எழுத்துக்களின் பிறப்பு 3. மாத்திரைகள் 4. பயிற்சிக்குரியன - மொழிபெயர்ப்பு (ஆங்கிலத்திலிருந்து தமிழுக்கு மொழிபெயர்த்தல்)	10
Total		**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

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

Course Objectives

- Improves grammatical knowledge
- To read and learn about articles and think about them
- 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	CLO Statements	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		

Part – I: Hindi – I

Unit	Content	No. of Hours
I	**Prose : Nuthan Gadya Sangrah** Lesson 1 – Bharathiya Sanskurthi - Dr.Rajendra Prsad 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 Hours	**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
- To read and learn about articles and think about them
- 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;**K4**-Analyse		

Part – I: Malayalam – I

Unit	Content	No. of 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 Objectives

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 Learning 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		

Part – I: French – I

Unit	Content	No. of 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 Hours	**60**
Text Books		
1	Céline Himber, Corina Brillant, Sophie Erlich, (2008), Adomania 1 – Methode de francais, Publisher - Hachette Fle.	
Reference Books		
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		

Part - 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
25BMA13C	Classical Algebra	Core	5	4

Course Objectives

The Course intends to cover

- Binomial, exponential, and logarithmic series, as well as instruct them on their application in calculating sums of series.
- The demonstration of typical methods used to solve transcendental and polynomial equations.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Recall convergence tests for series of positive terms.	K1
CLO2	Understand techniques to sum the series using binomials in summation series	K2
CLO3	Apply the principles of logarithmic and exponential series	K3
CLO4	Apply the number of positive and negative roots in a polynomial equation	K3
CLO5	Analyze the method of approximation to troubleshoot the problems with precision in auto mechanics	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** – Analyze		

CLO – PLO Mapping

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

Core - I: Classical Algebra

Unit	Content	No. of Hours
I	**Convergency and Divergency of series**: General Theorems-Series of positive terms- Comparison tests - Cauchy‟s condensation test -De-Alembert‟s ratio tests-Cauchy‟s root test-Raabe‟s Test.	15
II	**Binomial Theorem**: Binomial Theorem-Positive integral index-General term-Binomial Coefficients-Binomial theorem for rational Index-Application of the Binomial theorem to the summation of Series-Approximate values.	15
III	**Exponential and Logarithmic**: Exponential limit-The Exponential Theorem-Summation-Logarithmic series theorem-Modification of logarithmic series-Summation Problems	15
IV	**Theory of Equations:** Remainder Theorem- Roots of an equation- Relations between the roots and coefficients of equations- Symmetric function of the roots - Reciprocal equation -Descartes rule of signs.	15
V	**Rolle's theorem**: Multiple roots-Newton‟s Method of divisors - Horner‟s Method.	15
	Total Hours.	**75**
Text Book		
1	Manicavachagom Pillay T.K(2019),Natarajan T & Ganapathy K.S,"Algebra S. Viswanatham Printers & Publishers Private Ltd. Unit I: Chapter 2: Pg. No: 43-83. Unit II: Chapter 3: Pg. No: 99-111, 115-120, 124-130,143-152,168-170. Unit III: Chapter 4: Pg. No: 188-207,213-221, 224- 226. Unit IV: Chapter 6: Pg. No: 282-307,321-327,351-355. Unit V: Chapter 6: Pg. No: 355-362,370-382.	
Reference Books		
1	Kandasamy.P (2022), K.Thilagavathy. "Mathematics for B.Sc. Branch I (Vol. 1)" S.Chand and Company Ltd., New Delhi.	
2	Bali N.P (2010), "Algebra", Laxmi Publications, New Delhi.	
Web Resources (Swayam / NPTEL)		
1	https://nptel.ac.in/courses/111101001	

Course Code	Course Name	Category	Hours / Week	Credits
25BMA14C	Calculus	Core	5	4

Course Objectives

The Course intends to cover

- The concepts of curvatures.
- The understanding of integrating various types of functions.
- The fundamentals of double and triple integrals.
- The application of integration for tackling practical challenges encountered across different domains, encompassing rate of change, optimization, area, and volume.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Remember the basis of calculus as well as how to calculate curvature, involutes and evolutes.	K1
CLO2	Understand the fundamental concepts of different methods of integration such as substitution, partial fraction and integration by parts.	K2
CLO3	Demonstrate proficiency in using reduction formulae and computing double and triple integrals.	K3
CLO4	Apply techniques of changing the order of integration and variables in multiple integrals using Jacobians.	K3
CLO5	Apply the Beta and Gamma functions to solve the multiple integrals.	K3
K1 - Remember;**K2** - Understand;**K3** – Apply.		

CLO – PLO Mapping

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

Core II: Calculus

Unit	Content	No. of Hours
I	**Partial differentiation, errors and approximation:** Total differential coefficient-special case-Implicit functions-Homogeneous functions. **Envelopes, curvature of plane curves:** Envelopes- Method of finding envelope-Curvature-Circle, radius and centre of curvature- Cartesian formula for radius of curvature-coordinates of centre of curvature-Evolute and involute- Radius of curvature when the curve is given in polar co-ordinates-p-r equation; pedal equation of a curve.	15
II	**Integration:** Definite integrals- Methods of integration-Integrals of functions-Integration of irrational functions- Integration by parts-Bernoulli‟s Formula.	15
III	**Integration:** Reduction formulae. **Multiple Integrals:** Evaluation of double integrals- double integral in polar coordinates-triple integrals.	15
IV	**Multiple Integrals:** Change of order of integration in double integral-Jacobians Change of variables in double and triple integrals-Applications.	15
V	**Improper Integrals: Beta and Gamma Functions:** Beta and Gamma functions-recurrence of Gamma functions-Properties of beta functions-Relation between beta and gamma functions.	15
	Total Hours.	**75**
Text Books		
1	Manicavachagom Pillay T K (2022), Narayanan S, “Calculus (Vol.1)”, (S.Viswanathan Printers & Publishers Private Ltd). Unit I: Chapter VIII: Section: 1.3-1.6 Chapter X : Section: 1.1-1.4, 2.1-2.7	
2	Manicavachagom Pillay T K (2009), Narayanan S, ” Calculus (Vol.2)”,(S.Viswanathan Printers & Publishers Private Ltd). Unit II: Chapter: I : Section: 4,5,6.1-6.6,7.1-7.5,8-12,15.1 Unit III: Chapter: I : Section: 13.1-13.10 Chapter V: Section: 2.1-2.2,3.1-3.2,4 Unit V Chapter VII: Section: 1.1 - 1.5,2.1 – 2.3, 3, 4, 5.	
3	Kandasamy P (2022),Thilagavathi K,” Mathematics for B.Sc. Branch I-Volume II”,(S.Chand and Company Limited). Unit IV: Chapter: VI Pg No.: 432-465	
Reference Books		
1	Shanthi Narayanan(2014),Kapoor J.N. “ A Text book of Calculus”,S.Chand & Co.,	
2	Thomas G.B (2005), Finney R.L,”Calculus”, 9th Ed.,Pearson Education,Delhi.	
Web Resources (Swayam / NPTEL)		
1.	https://nptel.ac.in/courses/111105122	

Course Code	Course Name	Category	Hours / Week	Credits
25BMA15P	Calculus using Scilab	Core lab	4	2

S. No.	List of Practicals
1	Create a simple program using basic operations of scilab.
2	Determine the maxima and minima of a function.
3	Solve and plot Standard Cartesian curves
4	Find the standard polar plot using numerical values.
5	Plot the standard parametric curves.
6	Calculate the area and volume of a sphere and cylinder
7	Verify Euler‟s theorem, its extension and Jacobian value.
8	Create a program to illustrate the left hand and right hand limits for discontinuous function.
9	Develop a program to illustrate the continuity of a function.
10	Create a program to illustrate the differentiability of a function.
11	Create a program to illustrate the integrability of a function.
12	Demonstrate Rolle's Theorem.
13	Execute the Lagrange's theorem.
14	Demonstrate Cauchy's mean value theorem.
15	Demonstrate Taylor's theorem for a given function.
16	Evaluate the limit values using by L‟Hospital‟s rule.
	Total Hours. 60
Text Book	
1	Narayan, S, & Mittal, P. K. (2014),” Differential Calculus” S. Chand and Co. Pvt. Ltd.
Reference Book	
1.	Spiegel, E. (2012),” Schaum‟s Outline of Advanced Calculus” 5th Edition, McGraw Hill.
Web Resources(Swayam/NPTEL)	
1	https://nptel.ac.in/courses/103106074

Course Code	Course Name	Category	Hours / Week	Credits
25BMA16A	Statistics -I	Allied– I	4	3

Course Objectives

The Course intends to cover

- The random variables, distribution function and probability density function
- The distributions of Binomial, Poisson and Normal.

Course Learning Outcomes

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

CLO	CLO Statements	Knowledge Level
CLO1	Remember the classification of random variables.	K1
CLO2	Understand the characteristics of probability distribution functions.	K2
CLO3	Discuss about the probability principles by applying them to actual circumstances.	K2
CLO4	Apply the law of conditional probability and forecast the weather condition.	K3
CLO5	Analyze various distributions to resolve straightforward real-world issues.	K4
K1 - Remember; **K2** - Understand; **K3** - Apply; **K4** - Analyze		

CLO – PLO Mapping

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

Allied I: Statistics-I

Unit	Content	No. of Hours
I	**Random Variables and Distribution Functions:** Distribution function - Discrete random variable - Continuous random variables - Probability density function.	12
II	**Mathematical expectation** : Expected value of a random variable -Expected value of function of a random variable - Properties of expectation	12
III	**Generating functions and Law of large numbers:** Moment Generating Function - Cumulants - Characteristic function - Chebyshev‟s inequality - Weak law of large numbers.	12
IV	**Special discrete probability distributions:** Binomial distribution - Poisson distribution.	12
V	**Special continuous probability distributions:** Normal distribution - Lindeberg - Levy theorem (Statement only) - Liapounoff‟s theorem (Statement only) – **Linear and curvilinear regression:** Linear regression- Curvilinear regression- regression curves.	12
	Total Hours.	**60**
Text Book		
1	S.C. Gupta(2020), V.K. Kapoor ,“Fundamental of Mathematical Statistics”, S. Chand and Company Ltd, New Delhi. UNIT I : Chapter 5 Section : 5.1 - 5.3, 5.4.1 UNIT II : Chapter 6 Section : 6.1 - 6.4 UNIT III : Chapter 7 Section: 7.1 - 7.3, 7.5, 7.7 UNIT IV : Chapter 8 Section : 8.1, 8.4 - 8.5 UNIT V : Chapter 9 Section : 9.1, 9.2, 9.13.2, 9.13.4 Chapter 11 Section : 11.1 - 11.4	
Reference Books		
1	S.P. Gupta(2011), “Statistical Methods”, Sultan Chand & Sons, New Delhi.	
2	C.B. Gupta, (2004), “An Introduction To Statistical Methods”, Vikas Publishing House Pvt Ltd.	
Web Resources (Swayam / NPTEL)		
1	https://nptel.ac.in/courses/111101004	

*** Statistical Table shall be provided for ESE**
***Question paper to be set with 10% theory and 90% problems**

Part – IV: Foundation Courses

(All the Undergraduate Programmes)

Course Code	Course Name	Category	Hours / Week	Credits
25ENV1FC	Environmental Studies	FC- I	2	2

Unit	Content
I	The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.
II	**Natural Resources:** Renewable and non-renewable resources: Natural resources and associated problems. • Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people. • Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems. • Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies. • Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. • Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies. • Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.
III	**Ecosystems** • Concept of an ecosystem. • Structure and function of an ecosystem. • Producers, consumers and decomposers. • Energy flow in the ecosystem. • Ecological succession. • Food chains, food webs and ecological pyramids. • Introduction, types, characteristic features, structure and function of the following ecosystem: - a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

Unit	Content
IV	**Biodiversity and its Conservation** • Introduction-Definition: genetic, species and ecosystem diversity. • Bio geographical classification of India. • Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. • Biodiversity at global, National and local levels. • India as a mega-diversity nation. • Hot-spots of biodiversity. • Threats to biodiversity: habital loss, poaching of wildlife, man-wildlife conflicts. • Endangered and endemic species of India. • Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
V	**Environmental Pollution Definition** • Causes, effects and control measures of: - a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution e. Noise pollution f. Thermal pollution g. Nuclear hazards • Solid waste Management: Causes, effects and control measures of urban and industrial wastes. • Role of an individual in prevention of pollution. • Pollution case studies. • Disaster management: floods, earthquake, cyclone and landslides.
VI	**Social Issues and the Environment** • From Unsustainable to Sustainable development. • Urban problems related to energy. • Water conservation, rain water harvesting, watershed management. • Resettlement and rehabilitation of people; its problems and concerns. Case studies. • Environmental ethics: Issues and possible solutions. • Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies. • Wasteland reclamation. • Consumerism and waste products. • Environment Protection Act. • Air (Prevention and Control of Pollution) Act. • Water (Prevention and Control of Pollution) Act. • Wildlife Protection Act. - Forest Conservation Act. • Issues involved in enforcement of environmental legislation. • Public awareness.

Unit	Content
VII	**Human Population and the Environment** • Population growth, variation among nations. • Population explosion-Family welfare Programme. • Environment and human health. • Human Rights. • Value Education. • HIV/AIDS. • Women and Child Welfare. • Role of information Technology in Environment and human health. • Case Studies. **Biosafety and Biosecurity** The basic principles of biosafety. - Biological hazards and assess risk in laboratory settings. - Biosafety protocols to minimize risks associated with biological agents. - Role of biosafety in the protection of public health, environment, and nationalsecurity. The theoretical knowledge as well as practical applications to prepare learners for real-world biosafety challenges. 1. Introduction to Biosafety - Definition and importance of biosafety. - Historical perspective on biosafety incidents. - Biosafety vs. biosecurity: Key differences. 2. Biological Hazards and Risk Assessment - Classification of biological agents (e.g., bacteria, viruses, fungi, parasites). - Risk assessment methodology: Identifying hazards, evaluating risks, and control measures. 3. Biological Waste Management - Types of biological waste: Solid, liquid, sharps, etc. - Waste disposal techniques: Autoclaving, incineration, chemical disinfection. - Environmental impact and regulations surrounding waste management. 4. Standard Operating Procedures (SOPs) and Safety Practices - Developing and implementing SOPs for laboratory safety. - Practices for handling, storing, and disposing of biological materials.
VIII	**Field Work (Practical).** • Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain. • Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. • Study of common plants, insects, birds. • Study of simple ecosystems-pond, river, hill slopes, etc.
	Total Hours. 30
Reference Resources	
1.	https://www.ugc.gov.in/oldpdf/modelcurriculum/env.pdf
2.	Biosafety in Microbiological and Biomedical Laboratories (CDC, NIH). (BMBL). 6th Edition.
3.	Sateesh, M. K. (2010). Bioethics and Biosafety. New Delhi: I. K. International Pvt Ltd.
4.	Additional Readings:Relevant journal articles, government publications, and guidelines (e.g., WHO, CDC, European Union, etc.). https://www.iberdrola.com/innovation/what-is-biosafety

Part – IV : Ability Enhancement Compulsory Courses(AECC)

(All the Undergraduate Programmes)

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

Course Objectives

The course intends to cover

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

Course Learning Outcomes

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
I		**Presentation Skills**	
	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)	

		Confidence	
	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.	
III		**Creativity**	
	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 Internal Assessment and Distribution of Marks for CIA (Foundation Course -Theory)

Max Marks	Marks for		Components for CIA				
	CIA	ESE	CIA		Model		Total
			Actual	Weightage	Actual	Weightage	
50	50	-	50	**25**	50	**25**	**50**

Question Paper Pattern

Duration in Hours	Mode of Exam	Type of Questions	No. of Questions	Marks
2	Offline	Open Choice	5 (Out of 8)	5 x 10=50

Components 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