KANNUR UNIVERSITY
കണ്ണൂർ സർവകലാശാല

(Abstract)

Five Year Integrated Programme in Master of Computer Applications at the Information Technology Education Centre (ITEC) , Dr . Janaki Ammal Campus , Palayad- Scheme and Syllabus of Second semester (Only) - Approved and Implemented w .e .f 2025 Admission -Orders issued.

ACADEMIC C SECTION

ACAD/ACAD C1/17099/2025 Dated: 05.01.2026

Read:-1. ACAD D/ ACAD D5/4513/2024 dated 28.03.2025

2 .Email dated 06.08.2025 from the Dean , Faculty of Technology

3. ACAD/ACAD C1/17099/2025 dated 16.09.2025

4. Email dated 30.11.2025 from the Dean , Faculty of Technology

5 Orders of Vice Chancellor in file of even no, dated 03.12.2025

6. Minutes of the meeting of Standing Committee of Academic Council held on 05.12.2025

ORDER

- The proposal to start the Five Year Integrated Programme in Master of Computer Applications at the Information Technology Education Centre (ITEC), Dr. Janaki Ammal Campus, Palayad, with effect from the 2025 admission, was approved vide paper read (1) above.
- Subsequently, the Head, Dept. of Information Technology had forwarded the Scheme and Syllabus of the Programme (up to sixth semesters) for approval , along with the minutes of the Department Council.
- The Scheme and Syllabus of First Semester of the Five Year Integrated Programme in Master of Computer Applications were approved and implemented with effect from the 2025 admission, vide paper read (3) above.
- The Scheme and Syllabus (Second to Sixth Semesters) of the above programme, submitted by the Head, Dept. of Information Technology were forwarded to the Dean, Faculty of Technology, and the Dean, vide paper read (5) above, submitted the remark "Verified."
- Considering the matter, the Vice-Chancellor ordered to place the syllabus before the Standing Committee of the Academic Council for consideration.
- The Standing Committee of the Academic Council, vide paper read (6) above, considered the Second Semester Scheme and Syllabus of the Five Year Integrated Programme in Master of Computer Applications at the Information Technology Education Centre (ITEC), Dr. Janaki Ammal Campus, Kannur University, to be implemented with effect from the 2025 admission, and recommended to approve the same.

- The Vice-Chancellor, after considering the recommendations of the Standing Committee of the Academic Council and in exercise of the powers of the Academic Council conferred under Section 11(1), Chapter III of the Kannur University Act, 1996, and all other enabling provisions read together, approved the Second Semester Scheme and Syllabus of the Five Year Integrated Programme in Master of Computer Applications and accorded sanction to implement the same at the Information Technology Education Centre (ITEC), Dr. Janaki Ammal Campus, Palayad, with effect from the 2025 admission.
- The approved Second Semester Scheme and Syllabus of the Five Year Integrated Programme in Master of Computer Applications at the Information Technology Education Centre (ITEC), Dr. Janaki Ammal Campus, implemented with effect from the 2025 admission, are appended to this University Order and uploaded in the University website (www.kannuruniv.ac.in).

Orders are issued accordingly.

Sd/-
Jisha K P
Assistant Registrar II
For REGISTRAR

To: 1. Head, Dept.of Information Technology ,
2.Controller of Examinations (Through PA)
3. Nodal Officer, FYIMP

Copy To: 1. PS to VC, PA to R, PA to CE
2. JR II (Exam)
3. EP IV/EG I/EXC I Sections (Exam)
4. IT Cell (to publish in the website)
5. Computer Programmer
6. SF/DF/FC

KANNUR UNIVERSITY
CIVIL STATION P.O.
KANNUR
Pin-670 002
THAVAKKARA

Forwarded / By Order

SECTION OFFICER

SCHOOL OF INFORMATION SCIENCE & TECHNOLOGY

INFORMATION TECHNOLOGY EDUCATION CENTRE

(Extension centre -Janaki Ammal Campus Palayad)

KANNUR UNIVERSITY

DEGREE OF

FIVE YEAR INTEGRATED PROGRAMME IN

MASTER OF COMPUTER APPLICATIONS

B.C.A leading to B.C.A (Honours) & M.C.A

(Choice Based Credit System)

SCHEME & SYLLABUS

(FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2025 – 26 ONWARDS)

SCHEME AND SYLLABUS FOR THE DEGREE OF

FIVE YEAR INTEGRATED PROGRAMME IN MASTER OF COMPUTER APPLICATIONS

WITH MULTIPLE PATHWAYS

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC YEAR 2025 – 26 ONWARDS

1 PROGRAMME SPECIFIC OUTCOMES

SL #	Outcome
PSO1	Familiar with the entrenched concepts of Computer Science and Applications
PSO2	Enhance the knowledge and skills about System Software and Application Software
PSO3	Attain skills to design Algorithms and Programs
PSO4	Acquire the knowledge in the building, designing and managing IT and IT enabled infrastructure
PSO5	Design, build, and test software systems to meet the given specifications by following the principles of Software Engineering

DEFINITIONS

- Department / School is the department / school established in the Kannur University as per the statute of Kannur University.
- Information Technology Education Center is an extension center of Department /School of Information Technology.
- Academic programs offered through this extension center is fully controlled and monitored by the Department/School of Information Technology.
- All the programs offered through this extension center is approved by the council of Department/School of Information Technology.

- Head of the Department/one of the senior faculty appointed by the Vice Chancellor shall monitor all the activities conducted through this extension center. He/ She shall the responsibility all academic activities in the extension center and also regularly evaluate the status of all faculties and academic curriculums in the center.
- Academic programme is an entire course of study comprising the details such as the programme structure, course details, and evaluation schemes designed to be taught and evaluated in the teaching department / IT education center or jointly under more than one such department / center.
- Course is a segment of a programme limited to one semester subject.
- Programme Structure is a list of courses (Discipline specific Core Courses (DSC), Discipline specific Elective Courses (DSE), Ability Enhancement Courses (AEC) , Value Added Courses (VAC), Skill Enhancement Courses (SEC), and MOOC) that makes up an academic programme, specifying its details such as the syllabus, credits, hours of teaching, evaluation and examination schemes, and the minimum number of credits required for successful completion of the program prepared in conformity with the NEP 2020/AICTE/regulations-2024 of Kannur University.
- Discipline Specific Core (DSC) is a course that is to be compulsorily completed by a student admitted to a particular programme to receive the degree and which cannot be substituted by any other course.
- Discipline Specific Elective (DSE) is an optional course to be selected by a student out of such courses offered in the same department or other departments.
- Wherever in this document "the University" is mentioned, it should be taken as the Kannur University and wherever "the Department" is mentioned, it should be taken as the School of Information Technology/Information Technology Education Center where the respective course is offered.

2 SCOPE

1) This regulation shall apply to Five Year Integrated Programme in Master of Computer Applications with multiple pathways, conducted either by school of information technology or Information technology Education Centre working as an extension centre, Kannur University.

2) Choice Based Credit Semester System presupposes academic autonomy, cafeteria approach in academic environment, semester system, course credits, alphabetical grading. The course may be either offered by the Department of Information Technology, Mangattuparamba Campus or an extension centre setup by the university in other campuses. In such case the programme offered is strictly under the monitoring of the Department of Information Technology and all course related activities are done by the extension centre, and all these activities are monitored by the senior faculty of the department deputed by the Hon. Vice Chancellor of the University.

3) The Name of degree awarded when a student take exit at 3^{rd} /4^{th}/5^{th} year is specified in the different pathways mentioned as part of this regulation. "*The Name "Five Year Integrated Programme in Master*

of Computer Application" is only for indicating the five year span of the program according to NEP2020/AICTE/Kannur University regulation".

4) Students enrolled in the Five-Year Integrated Programme in Master of Computer Applications (MCA) at the Information Technology Education Centre (ITEC), Janaki Ammal Campus, Thalassery shall complete the first three years of their study at ITEC, Janaki Ammal Campus, Thalassery Campus. On successful completion of the third year, the student has the option to exit the program with a BCA degree or continue to the fourth year for a BCA (Honours) with an exit /and to proceed fifth year to complete the MCA at the Department of Information Technology, Mangattuparamba Campus.

3 ADMISSION

1) Admission to the Five Year Integrated Programme in Master of Computer Applications (Bachelor degree of Computer Application (BCA) leading to BCA (Honours) and MCA with multiple pathways with different specialization) will be done as the regulations prescribed by the university from time to time.

Eligibility for Admission:

Basic qualifications: Candidate must possess

1) Pass with 50% marks/equivalent grade at 10+2 level or equivalent

AND

2) Mathematics/statistics/computer science/computer application/ informatics practices as one of the subjects at 10+2 level.

Admission to the Five-Year Integrated Programme in Master of Computer Applications programme shall be made purely based on the entrance examination conducted by the university. Notification in this regard shall be made well in advance. If the number of candidates admitted based on the entrance examination is less than the sanctioned strength, the department can fill the vacancy by advertising the vacancy through press releases. Admission to these seats should be granted based on the marks obtained by the candidates in the qualifying examination. Reservation norms followed by the university should be adhered to in the admission process.

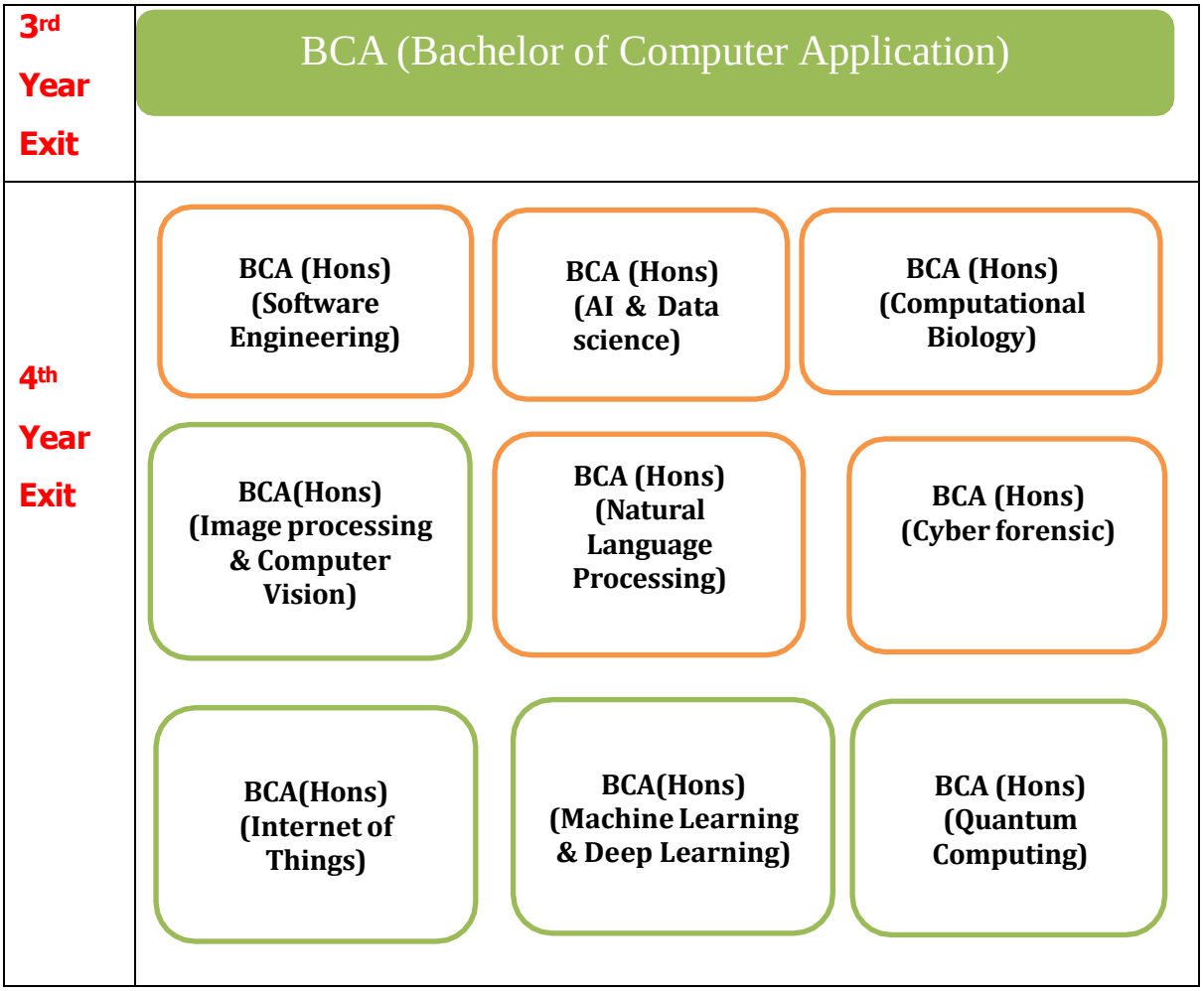
4 REGISTRATION

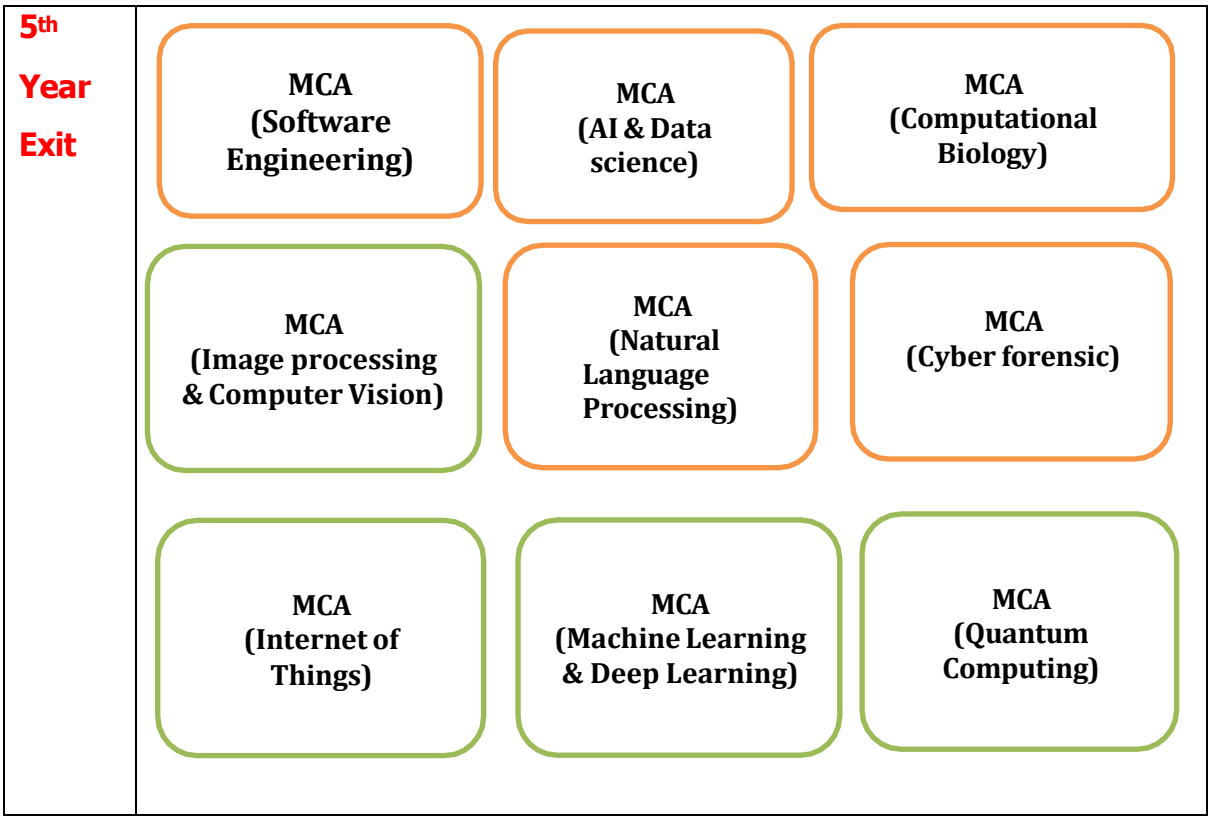
Since students have flexibility to choose various courses and pathways, every student should register for a course for the next semester by the end of the previous semester (except the first semester). Any changes in the selection of the courses are permitted up to the 5 working days of the start date of the new semester. The offering department can decide on the minimum / maximum number of registrations for a course depending on the instructional facilities and teachers' availability for the listed courses. While choosing the courses students are advised to discuss with semester coordinator/ faculty advisor and also ensure that, the credit requirement for awarding the degree in various pathways as per FYIMP-

2024 regulations are satisfied. Student can register for additional courses including MOOCs from second semester onwards, provided the total number of courses registered for that semester is not more than 30.

5 PROGRAMME STRUCTURE

1) Duration of the Five Year Integrated Program in Master of Computer Applications program shall be 5 years, divided into 10 semesters. Each semester shall have 18 weeks. Students can take exit at 3rd / 4th /5th year as mentioned in FYIMP regulations-2024-25. The Name of the degree awarded to each student will be depending on the pathway courses opted by the students while taking exit at above mentioned years. Different Pathways and corresponding names of degree awarded is mentioned in the below diagram.





2) Minimum and maximum duration for completing the courses will be based on the FYIMP-2024 regulations of the University.

3) Degree may be awarded after securing the minimum required credits for the programme after the 3rd / 4th or 5th year exit as Bachelor Degree in Computer Applications (BCA)/ Bachelor Degree in Computer Applications in Hons with respective specialization or Master of Computer Applications with respective specialization chosen by the students according to the pathway mentioned in the regulations based on the FYIMP 2024 regulations/AICTE norms.

6 MOOC

In addition to the courses specified as part of the programme, all students should mandatorily complete 2 MOOC courses of at least 3 credits to complete the requirements of getting BCA (Hons) degree in any of the specialization. The credits earned also will be considered for the computation of GPA and CGPA.

7 EVALUATION

The Continuous and Comprehensive Evaluation (CCE) and the End semester Evaluation (ESE) will be conducted as per the Kannur University FYIMP/AICTE Regulations for all theory and practical courses unless it is specifically mentioned in the respective courses. The ratio of Continuous and Comprehensive Evaluation and End semester Evaluation shall be 50:50.

End Semester Evaluation

End semester Evaluation will be conducted as per FYIMP Regulations-2024.

The courses offered under these programs have either 3 credits or 4 credits courses such as, DSC, DSE, AEC, SEC, VAC, MOOC and Internship. The credit for a given course is typically distributed as follows

Distribution Teaching / Learning hours for 4 Credit Course

1. 4 Credit Lecture session
2. 3 Credit Lecture Sessions and 1 Credit Practical session
3. 2 Credit Lecture Session and 2 Credit Practical session
4. 1 Credit Lecture Session and 3 Credit Practical session
5. 4 Credit Practical Sessions

Similarly, Distribution Teaching / Learning hours for 3 Credit Course

1. 3 Credit Lecture session
2. 2 Credit Lecture Session and 1 Credit Practical Session
3. 1 Credit Lecture Session and 2 Credit Practical Session
4. 3 Credit Practical Session

End Semester Examination for all these different combinations are as Follows

ESE Scheme for 4 Credit courses		
1	4Credit Theory	Theory Examination of 50 marks. Duration of Examination 2 Hours
2	3 credit Lecture and 1 Credit Practical	ESE (Theory) Maximum marks: 50 marks Duration:2 hours. The obtained Marks will be scaled to 37.5 ESE(Practical) Maximum marks: 50 marks. Duration: 3 hours. Marks obtained will be scale down to 12.5 Total marks obtained for the course will be the sum of scaled ESE marks obtained for theory and practical. i.e. 50 marks
3	2 credit Lecture and 2 Credit Practical	ESE (Theory) Maximum marks: 50 marks Duration:2 hours. The obtained Marks will be scaled to 25 ESE(Practical) Maximum marks: 50 marks. Duration: 3 hours. Marks obtained will be scale down to 25 Total marks obtained for the course will be the sum of scaled ESE marks obtained for theory and practical. i.e. 50 marks
	1 credit Lecture and 3 Credit Practical	ESE(Theory) Maximum marks: 50 marks Duration:2 hours. The obtained Marks will be scaled to 12.5 ESE(Practical) Maximum marks: 50 marks. Duration: 3 hours. Marks obtained will be scale down to 37.5

		Total marks obtained for the course will be the sum of scaled ESE marks obtained for theory and practical. i.e. 50 marks
	4 Credit Practical	Practical Examination of 50 marks. 3 hours Duration
ESE Scheme for 3 Credit courses (SEC/MDC/VAC)		
	3 Credit Theory	ESE will be conducted for 50 marks
	2 Credit theory and 1 Credit Practical	ESE (Theory) Max marks: 50; Duration: 2 Hours scaled to 30 marks ESE (Practical) Max marks: 50; Duration 2 Hours scaled to 20 marks Total marks obtained for the course will be the sum of scaled ESE marks obtained for theory and practical. i.e. 50 marks
	1 Credit for Theory and 2 Credit for Practical	ESE (Theory) Max marks: 50; Duration: 2 Hours scaled to 20 marks ESE (Practical) Max marks: 50; Duration 2 Hours scaled to 30 marks Total marks obtained for the course will be the sum of scaled ESE marks obtained for theory and practical. i.e. 50 marks
	3 Credit Practical	ESE will be conducted for 50 marks

If any changes in the evaluation patten for any courses it can be mentioned in the assessment rubrics of the corresponding course. Otherwise it will be followed the above rubrics corresponding to their credit.

Continuous and Comprehensive Evaluation (CCE).

CCE for all courses shall follow the FYIMP- Computational Science -Scheme and syllabus -2024 unless it is specifically mentioned in the course syllabus. Where ever there is a practical component associated with a course; Lab test will be conducted as part of CCE, in addition to the other evaluation methods mentioned in FYIMP-Regulations 2024 for CCE. The division of CCE marks for different courses structure shall be as follows.

Course structure	Continuous Assessment
4 Credit course	**Total Marks: 50** Test paper 1: 10 Test Paper 2: 10 Attendance:10 Assignment: 10 Case study/Seminar /Viva: 10
4 Credit course	**Total Marks: 50**

(3 Lecture+ 1 Lab)	Test 1: 10 Test 2: 10 Attendance: 10 Lab Test and viva : 10 Record: 05 Assignments/case study/ seminar: 05
4 Credit (2 Credit Lecture and + 2 Credit Practical)	**Total Marks: 50** Test 1: 10 Test 2: 10 Attendance:10 Lab Test and viva: 10 Record: 05 Assignments/ case study/ seminar: 05
4 Credit (1 Credit Lecture + 3 Credit Practical)	**Total Marks 50** Test paper 1: 05 Test Paper 2: 05 Attendance: 05 Lab test 1 and viva: 10 Lab Test 2 and viva: 10 Lab record: 5 Seminar/ Assignments / Case Study: 10
4 Credit Practical	Total Marks Lab test 1 and viva: 15 Lab test 2 and viva: 15 Attendance :10 Record: 10
3 Credit Courses (MDC/SEC/VAC) offered by the IT/Maths/Statistics	
3 credit Lecture	**Total Marks 50** Test 1: 15 Test 2: 15 Attendance:10 Seminar /Assignment/ Case Study: 10
2 Credit Lecture + 1 Credit practical	**Total Marks 50**

	Test 1: 10 Test 2: 10 Lab test: 10 Attendance:10 Record: 05 Seminar/Assignment / Case study: 05
1 Credit Lecture and 2 Credit Practical	**Total Marks 50** Test 1: 05 Test 2: 05 Attendance:10 Lab test with Viva: 20 Record: 5 Assignment / Case study/ Seminar: 05
3 Credit Lab	**Total Marks 50** Lab test 1 and viva: 15 Lab test 2 and viva: 15 Attendance:10 Record: 10

The end semester practical examination will be conducted by a board of examiners constituted by the Head of the department/Assistant Director of the extension centre where the course is offered. The board of examiners consist of 2 faculty members and one should be the faculty in charge of the respective course. Total minimum requirement for every CCE component for a pass shall follow the minimum requirement mentioned in FYIMP-2024 regulations. If any other mode of assessment is proposed for a specific course; the assessment rubrics should be mentioned in the syllabus separately associated with that course. Otherwise, evaluation scheme mentioned in the regulations shall be applicable for both CCE and ESE.

Evaluation criteria for the Research, Internship components will follow the criteria mentioned in FYIMP-2024 regulations.

8 COMPLIANCES WITH FYIMP- REGULATIONS -2024

In general, FYIMP – Five Year Integrated Programme in Master of Computer Applications follows the FYIMP-regulations approved by university/AICTE norms. Department council have the sole right to revise the scheme and syllabus based on the feedback and input from various stake holders of the program.

CREDIT DISTRIBUTION AND EXIT PATHWAYS

Semester	Major/Minor DSC	Major DSE	AEC	SEC	MDC	VAC	Internship	MOOC	Total	
1	12		06		03				21	
2	16		03		03				22	
3	16				03	03			22	
4	12	04		03		03			22	
5	16	04		03					23	
6	12	04		03			04		23	
Total BCA	**84**	**12**	**09**	**09**	**09**	**06**	**04**		**133**	**3rd Year Exit**
7	12	08						04	24	
8	04	08					04	04	20	
Total BCA(Hon)	**100**	**28**	**09**	**09**	**09**	**06**	**12**	**08**	**177**	**4th Year Exit**
9										
10										
Total MCA										**6th Year Exit**

INTEGRATED MASTER OF COMPUTER APPLICATIONS

(BCA LEADING TO BCA WITH HONS & MCA)

Semester I

No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESE	CCE	T
1.1	100	KU1DSCMCA101	Introduction to Computational Informatics	60	4	4	0	1	50	50	100
1.2	100	KU1DSCMCA102	Principles of Programming	90	4	2	4	2	50	50	100
1.3	100	KU1DSCMCA103	Mathematical foundations for computer application	60	4	4	0	1	50	50	100
1.4	100		MDC-1-	60	3	2	2	1	50	50	100
1.5	100		AEC 1- English 1	45	3	3	0	1	50	50	100
1.6	100		AEC 2-English 2	45	3	3	0	1	50	50	100
				360	21	18	6	6	300	300	600

Semester II

No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESE	CCE	T
2.1	100	KU2DSCMCA104	Object Oriented Programming using C++	90	4	2	4	2	50	50	100
2.2	100	KU2DSCMCA105	Digital Electronics and Computer Organization	60	4	4	0	1	50	50	100
2.3	100	KU2DSCMCA106	Statistical Foundations for Computer Applications	60	4	4	0	1	50	50	100
2.4	100	KU2DSCMCA107	Database Management Systems	90	4	2	4	2	50	50	100
2.5	100		MDC-2	60	3	2	2	1	50	50	100
2.6	100		AEC-3 Additional Language	45	3	0	0	1	50	50	100
				390	22	14	08	08	300	300	600

Semester III

No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESA	CE	T
3.1	200	KU3DSCMCA201	Java Programming	90	4	2	4	1	50	50	100
3.2	200	KU3DSCMCA202	Introduction to Data Structure	90	4	2	4	1	50	50	100
3.3	200	KU3DSCMCA203	Web Technology	90	4	2	4	1	50	50	100
3.4	200	KU3DSCMCA204	Data communication and computer Networks	60	4	4	0	1	50	50	100
3.5	200		MDC-3	60	3	2	2	1	50	50	100
3.6	200		VAC-1	45	3	3	0	0	50	50	100
				375	22	19	6	5	300	300	600

Semester IV

No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESA	CE	T
4.1	200	KU4DSCMCA205	System Software and Operating System	60	4	4	0	1	50	50	100
4.2	200	KU4DSCMCA206	Software Engineering	60	4	4	0	1	50	50	100
4.3	200	KU4DSCMCA207	Artificial Intelligence	90	4	2	4	1	50	50	100
4.4	200	KU4DSEMCA20.x	DSE-1*	60	4	4	0	1	50	50	100
4.5	200		SEC-1	60	3	2	2	1	50	50	100
4.6	200		VAC-2	45	3	3	0	0	50	50	100
				365	22	19	6	5	300	300	600

	S4 - List of Discipline Specific Electives (DSE-1)										
No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESA	CE	T
4E.1	200	KU4DSEMCA208	Python Programming	60	4	4	0	1	50	50	100
4E.2	200	KU4DSEMCA209	Discrete Mathematics	60	4	4	0	1	50	50	100
4E.3	200	KU4DSEMCA210	Mobile Computing	60	4	4	0	1	50	50	100
4E.4	200	KU4DSEMCA211	Operating System Security	60	4	4	0	1	50	50	100
4E.5	200	KU4DSEMCA212	Design Thinking	60	4	4	0	1	50	50	100

Semester V

No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESA	CE	T
5.1	300	KU5DSCMCA301	Formal Language & Automate Theory	60	4	4	0	0	50	50	100
5.2	300	KU5DSCMCA302	Analysis and Design of Algorithms	60	4	4	0	1	50	50	100
5.3	300	KU5DSCMCA303	Introduction to IoT	75	4	3	2	0	50	50	100
5.4	300	KU5DSCMCA304	Machine Learning Techniques	75	4	3	2	1	50	50	100
5.5	300	KU5DSEMCA30.x	DSE-2 *	60	4	4	0	1	50	50	100
5.6	300	KU5SECMCA30.x	SEC-2	60	3	2	2	1	50	50	100
				390	23	20	6	4	300	300	600

S5 - List of Discipline Specific Electives (DSE)

No	Level	Course Code	Course Name	C	Hrs./wk.			Assessment Weightage (%)		
					L	P	Tt	ESA	CE	T
5E.1	300	KU5DSEMCA305	Computer Graphics	4	3	2	1	50	50	100
5E.2	300	KU5DSEMCA306	Data and Business Analytics	4	3	2	1	50	50	100
5E.3	300	KU5DSEMCA307	Wearable Computing and sensors	4	3	2	1	50	50	100
5E.4	300	KU5DSEMCA308	High Performance Computing	4	4	0	1	50	50	100
5E.5	300	KU5DSEMCA309	Game Development	4	3	2	1	50	50	100

Semester VI

No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESA	CE	T
6.1	300	KU6DSCMCA305	Big Data Analytics	60	4	4	0	0	50	50	100
6.2	300	KU6DSCMCA306	Quantum computing	60	4	4	0	0	50	50	100
6.3	300	KU6DSCMCA307	Generative AI	60	4	4	0	0	50	50	100
6.4	300	KU6DSEMCA310	DSE-3- Technology Specific Elective	60	4	4	0	0	0	100	100
6.5	300	KU5SECMCA30.x	SEC-3	60	3	2	2	1	50	50	100
6.6	300	KU6INTMCA301	Internship	60	4	-	9	5	50	50	100
					23	16	9	5	250	350	600

***DSE-3 Technology Specific Elective is meant to foster the students with tools and technologies that they need to know and make use in the design and development of software applications. Seminar Report / Case study report of a specific technology should be submitted by each student for the evaluation. The mode of evaluation of this course shall be based on the presentation, report and viva. It is evaluation is completely under CE component.**

S6 - List of Discipline Specific Electives (DSE-3)

No	Level	Course Code	Course Name	C	Hrs./wk.			Assessment Weightage (%)		
					L	P	Tt	ESA	CE	T
6E.1	300	KU6DSEMCA314	Information Security	4	4	0	1	50	50	100
6E.2	300	KU6DSEMCA315	Data and Information visualization	4	4	0	1	50	50	100
6E.3	300	KU6DSEMCA316	Virtual and Augmented Reality	4	4	0	1	50	50	100
6E.4	300	KU6DSEMCA317	Game Development	4	4	0	1	50	50	100
6E.5	300	KU6DSEMCA318	Computer Vision	4	4	0	1	50	50	100
6E.6	300	KU6DSEMCA319	Computational Photography	4	4	0	1	50	50	100
6E.7	300	KU6DSEMCA320	High performance computing	4	4	0	1	50	50	100
6E.8	300	KU6DSEMCA321	Green Computing	4	4	0	1	50	50	100

SKILL ENHANCEMENT COURSES (SEC)

	Semester 4 SEC POOL 1											
No	**Level**	**Course Code**	**Course Name**	**Total Hours**	**C**	**Hrs./wk.**			**Assessment Weightage (%)**		
						L	**P**	**Tt**	**ESA**	**CE**	**T**
4SE.1	200	KU4SECMCA201	Python Programming	60	3	2	2	0	50	50	100
4SE.2	200	KU4SECMCA202	Fundamentals of Digital Skilling using Google Workspace for Education	60	3	2	2	0	50	50	100
4SE.3	200	KU4SECMCA203	Web Technologies	60	3	2	2	0	50	50	100
4SE.4	200	KU4SECMCA204	R Programming	60	3	2	2	0	50	50	100
4SE.5	200	KU4SECMCA205	Digital Marketing	60	3	2	2	0	50	50	100

	Semester 5 SEC POOL 2										
No	**Level**	**Course Code**	**Course Name**	**Total Hours**	**C**	**Hrs./wk.**			**Assessment Weightage (%)**		
						L	**P**	**Tt**	**ESA**	**CE**	**T**
5SE.1	300	KU5SECMCA301	The Art of E - Documentation using Latex	60	3	2	2	0	50	50	100
5SE.2	300	KU5SECMCA302	Data Processing with Python	60	3	2	2	0	50	50	100
5SE.3	300	KU5SECMCA303	Data Science Fundamentals	60	3	2	2	0	50	50	100
5SE.4	300	KU5SECMCA305	Swift Programming	60	3	2	2	0	50	50	100
5SE.5	300	KU5SECMCA306	Application Development using React JS	60	3	2	2	0	50	50	100
5SE.6	300	KU5SECMCA307	Application Development using Flutter	60	3	3	3	0	50	50	100

	Semester 6 SEC POOL 3										
No	**Level**	**Course Code**	**Course Name**	**Total Hours**	**C**	**Hrs./wk.**			**Assessment Weightage (%)**		
						L	**P**	**Tt**	**ESA**	**CE**	**T**
6SE.1	300	KU6SECMCA308	Artificial Intelligence in Daily Life	60	3	2	2	0	50	50	100
6SE.2	300	KU6SECMCA309	Fundamentals of Big Data	60	3	2	2	0	50	50	100
6SE.3	300	KU6SECMCA310	Optimization Techniques	60	3	2	2	0	50	50	100
6SE.4	300	KU6SECMCA311	Web Application Security and Ethical Hacking	60	3	2	2	0	50	50	100
6SE.5	300	KU6SECMCA312	Mobile Application Security and Privacy	60	3	2	2	0	50	50	100

MULTI DISCIPLINARY COURSES

Semester 1/Semester 2 MDC POOL 2												
No	Level	Course Code	Course Name	Total Hours	C	Hrs./wk.			Assessment Weightage (%)		
						L	P	Tt	ESA	CE	T
1MD.1	100	KU1MDCMCA101	Introduction to Computational Informatics	60	3	2	2	0	50	50	100
1MD.2	100	KU1MDCMCA102	Principles of Programming	60	3	2	2	0	50	50	100
2MD.1	100	KU2MDCMCA201	Foundations of Data Science	60	3	2	2	0	50	50	100
2MD.2	100	KU2MDCMCA202	Object Oriented Programming using C++	60	3	2	2	0	50	50	100
3MD.1	200	KU3MDCMCA301	Cyber Forensics	60	3	2	2	0	50	50	100
3MD.2	200	KU3MDCMCA302	Scientific Computing	60	3	2	2	0	50	50	100

Semester I

KU1DSCMCA101 INTRODUCTION TO COMPUTATIONAL INFORMATICS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100	KU1DSCMCA101	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	1	50	50	100	2

Course Description: This course provides a comprehensive overview of computing, covering historical milestones, hardware components, software systems, and computational thinking principles. Students will explore the evolution of computing systems, from early pioneers to modern processors and quantum units. The curriculum delves into hardware intricacies, software distinctions, and essential concepts in computer science, emphasizing problem-solving skills and algorithmic thinking. Practical aspects include hands-on experiences with hardware assembling, operating system installation, algorithm and flowchart visualization.

Course Objectives:

- To become aware about the evolution and generation computer system and familiarises various components of computer systems
- To become familiar with various computer hardware components
- To understand different software components and its types and the installation and configuration of operating systems

  selection
- To familiarise different methodologies of problem solving using the computational thinking concept.

Course Outcomes:

At the end of the Course, the Student will be able to:

SL #	Course Outcomes
CO1	Develop a foundational knowledge of computing systems, encompassing their historical development, evolutionary milestones, and the notable contributions of key figures in the field.
CO2	Acquire familiarity with diverse hardware components constituting a computer system.
CO3	Attain the knowledge of computer software and the activities focused on the installation and configuration of diverse hardware components within a computer system including operating systems
CO4	Develop a foundational understanding of computer science as a discipline, examining problems through the lens of computational thinking and inducing the analytical skills to address challenges in the field.

Mapping of COs to PSOs

CO - PSO Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✔	✔	✔	✔	
CO2	✔	✔	✔	✔	
CO3	✔	✔	✔	✔	
CO4	✔	✔	✔	✔	✔

COURSE CONTENTS

UNIT 1 15 Hours	**Evolution of Computers:** History, Generations. Overview of Computer System- Von Neumann Model, Number Systems (Binary, Hexa, Octal, Decimal) , Digital Codes (Gray, Excess-3, BCD). Pioneers and Contributors of Computing Systems - First Mechanical computer - Charles Babbage, Stored-Program Architecture - John von Neumann, Turing machine - Alan Turing, First General-Purpose Electronic Digital Computer - John Mauchly and J. Presper Eckert, Artificial Intelligence- John McCarthy (Contributions only). Computing Systems: Past to Present - Single Core, Dual-Core and Multi-Core Processors, GPU, TPU, APU, and QPU.
UNIT 2 15 Hours	**Hardware:** Electronic Components – Active Components - Diode, Transistor, Integrated Circuits (Definition, Symbol and Function), Electronic Components - Passive Components – Resistors,

	Capacitors, Inductors (Definition, Symbol and Function). Motherboard Components – CPU and Cooling Fan, RAM, Expansion Slots (PCIe), Input/Output Ports, Chipset. Motherboard Components – BIOS/UEFI Chip, SATA/NVMe Slots, Network Interface, Ports- Ethernet, VGA, HDMI, USB . Computer Components – SMPS, Motherboard, Storage Devises (HDD, SSD, NVMe). Computer Components – RAM (DRAM, SRAM, DDR SDRAM), ROM, Cache.
First series examination including theory + Laboratory if any	
UNIT 3 15 Hours	**Software:** System Software, Examples. Operating System – Need of OS, Types – Proprietary and Open Source, Hardware Software Compatibility, POST, Booting. OS Installation – Bootable Media, UEFI/Legacy BIOS, Disk Partitioning, Dual Booting, Boot Manager – BOOTMGR, Grub, File Systems- FAT, NTFS, ext4. Device Drivers – Need of Device Drivers, Driver Interactions (Basic).
UNIT 4 15 Hours	**Module 4: Computational Thinking:** Problem Solving - Defining the Problem, Systematic Approach. Computational Thinking – Problem Decomposition, Pattern Identification, Abstraction, Generalization. Logical Thinking – Inductive and Deductive Reasoning, Logical Expressions. Algorithmic Thinking – Intuition vs Precision, Defining algorithms. Algorithm – Need of Algorithm, Qualities of a Good Algorithm, Examples. Flowchart - Flowchart Symbols, Examples. Raptor.
Second series internal examination including theory + Laboratory if any	

Books/References

1. Gary B. Shelly, Thomas J. Cashman, and Misty E. Vermaat. “Introduction to Computers”, Cengage Learning, 2008.
2. Pradeep K. Sinha and Priti Sinha, Computer Fundamentals: Concepts, Systems & Applications. BPB Publications.
3. Kevin Wilson, Computer Hardware: The Illustrated Guide to Understanding Computer Hardware. Amazon Digital Services LLC – KDP, 2018.
4. John Hanna, OS Installation 101: A Step-by-Step Approach for Newbies.
5. David Riley and Kenny Hunt, Computational thinking for modern solver, Chapman & Hall/CRC, 2014.
6. R.G. Dromey, How to solve it by Computer, PHI, 2008.

TEACHING LEARNING STRATEGIES

- Lecturing, case study/mini projects, Team Learning, presenting seminars on selected topics, Digital Learning

MODE OF TRANSACTION

- Lecture, Seminar, Discussion, Demonstration, Questioning and Answering, Video tutorial

ASSESSMENT RUBRICS

Refer to section 7.

KU1DSCMCA102 PRINCIPLES OF PROGRAMMING

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100	KU1DSCMCA102	4	90

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
2	4	2	50	50	100	2

*** ESE duration: 2 hours for theory and 3 hours for Lab**

Course Description: Computer Science is all about developing correct and efficient solutions for our day-to-day problems. The process of developing solutions is not centered on learning a programming language and doing coding straight away. Instead, a blueprint of the proposed solution should be outlined and tested for correctness. Once a proposed blueprint leads to a correct solution, it can be implemented using a suitable programming language. The objective of this course is to impart knowledge to the learner about building the blueprint of a solution. Learners are also exposed to implementing the solutions using the C programming language.

Course Objectives:

- To impart knowledge about various constructs for developing solutions
- To become familiar with using the various constructs to develop solutions
- To compare and contrast various constructs for solution development for selection
- To compare and contrast various constructs for solution development for iteration
- To implement solutions using C programming language

Course Outcomes:

At the end of the Course, the Student will be able to:

SL #	Course Outcomes
CO1	Illustrate the foundations of developing solutions using flowcharts and algorithms
CO2	Develop solutions using various selection constructs and implement them in the C programming language
CO3	Develop solutions using various iteration constructs and implement them in the C programming language
CO4	Understand advanced concepts in direct memory handling, file handling and functions.

Mapping of COs to PSOs

CO - PSO Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✔	✔	✔	✔	✔
CO2	✔	✔	✔	✔	✔
CO3	✔	✔	✔	✔	✔
CO4	✔	✔	✔	✔	✔

COURSE CONTENT

UNIT 1 05 Hours Theory + 05 Hours Lab	Problem-Solving: Preparing Solutions using Flowcharts: Conventions - Structure - Symbols. Preparing Solutions using Algorithms - Conventions - Top-Down and bottom-up approach. Program**:** Characteristics - Modular Approach - Style - Documentation and Maintenance - Compilers and Interpreters - Preparing, Running and Debugging Programs - Types of Errors. Fundamentals of C Language: Evolution and Features - Program Structure - Elements - Constructs. Character Set, Tokens, Keywords, Identifier. Data Types, Constants, Symbolic Constants, Variables, Data Input and Output, Statements - Assignment statements. Operators in C: arithmetic, relational, logical, assignment, auto increment, auto decrement, conditional, comma operators. Precedence of operators - expressions – evaluation of expressions, type conversion in expressions – precedence and associativity
UNIT 2	Selection Constructs: Simple if - if else - if else if ladder - switch. Branching statements: break, goto. Case study: Developing solutions (flowcharts and algorithms) for problems using various selection

05 Hours Theory + 15 Hours Lab	constructs - Comparative Study of various Selection Constructs - Converting a solution using one selection construct with other selection constructs.
First series internal examination including theory + Laboratory if any	
UNIT 3 07 Hours Theory + 15 Hours Lab	Iteration Constructs: Top Tested Vs Bottom Tested - while - for - do while - Nesting of loops - skipping breaking loops. Arrays - 1D and 2D, 3 D - Case study: Developing solutions (flowcharts and algorithms) for problems using various iteration constructs - Comparative Study of various iteration constructs - Converting a solution using one iteration construct with other iteration constructs. Functions and function calling mechanisms.
UNIT 4 13 Hours Theory + 25 Hours Lab	Advanced concepts in C: Concepts of memory allocation for variables- Direct memory accessing - Pointers- pointer arithmetic's- structures- files and file operations- preprocessor directives- preparing customized header files.
Second series internal examination including theory + Laboratory if any	

Books/References

1. J.B Dixit, Computer Fundamentals and Programming in C, Firewall Media
2. Anil Bikas Chaudhuri, The Art Of Programming Through Flowcharts Algorithms, Laxmi Publications, New Delhi.
3. Maureen Spraknle and Jim Hubbard, Problem Solving and Programming Concepts, Pearson
4. E Balagruswamy, Programming in ANSI C, TMH, 5th Edition
5. R G Dromey, How to Solve by Computer, Pearson Education, 5th Edition
6. Brian W. Kernighan and Dennis M. Ritchie, C Programming Language, PHI
7. Kanetkar, Let Us C, BPB Publications, 8th Edition

TEACHING LEARNING STRATEGIES

- Lecturing, case study/mini projects, Team Learning, presenting seminars on selected topics, Digital Learning

MODE OF TRANSACTION

- Lecture, Seminar, Discussion, Demonstration, Questioning and Answering, Video tutorial

ASSESSMENT RUBRICS

Refer to section 7.

KU1DSCMCA103: MATHEMATICAL FOUNDATIONS FOR COMPUTER APPLICATION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
1	DSC	100	KU1DSCMCA103	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	1	50	50	100	2

Course Description: This course provides a fundamental exploration of mathematical concepts essential for computer science. Students will explore into key topics including Linear Algebra, Differential and Integral Calculus. The course aims to equip students with the mathematical tools and reasoning skills necessary for creating and analyzing algorithms, understanding and solving computational problems in various areas of computer science like Data science, Artificial Intelligence.

Course Objectives:

- To impart knowledge propositional logic
- To become familiar with set theory and its applications.
- To acquaint with different matrix operations and arithmetic related to computer related problems selection
- To familiarise different types of linear equations and solving and interpreting the solutions

Course Outcomes:

At the end of the Course, the Student will be able to:

SL #	Course Outcomes
CO1	Reflect the concept of proportional logic , predicative logic and inference rule for solving computational problems
CO2	Understand the concept and use set theory for solving computational problems using reasoning and approximation.
CO3	Reflect the concept of matrices and determinants as a way to depict and streamline mathematical ideas to perform basic operations.
CO4	Acquire proficiency in solving linear equations using different techniques and understanding the geometric interpretation of solutions.

Mapping of COs to PSOs

CO - PSO Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✔	✔	✔	✔	✔
CO2	✔	✔	✔	✔	✔
CO3	✔	✔	✔	✔	✔
CO4	✔	✔	✔	✔	✔

COURSE CONTENT

UNIT 1 10 Hours	**Propositional Logic**: Basic logical operations, conditional statement, bi-conditional statement, converse, inverse and contrapositive statement, well-formed formula, tautology, contradiction, equivalence of formula. laws to determine equivalence, tautological implication. duality law, normal forms- (CNF, DNF, PCNF, PDNF), Predicate calculus- rules of inference, valid arguments, types of quantifiers, properties of quantifier**.**
UNIT 2 10 Hours	**Set Theory**: Set, types of set operations and laws. algebra of sets and duality, inclusion and exclusion principle, Cartesian product- Relations: Definition. properties of relation, types of relation, equivalence class, relation matrix and graph of relation, partition and covering of set, poset, composition of relation**.**

First series internal examination including theory + Laboratory if any	
UNIT 3 20 Hours	**Matrices and Determinants** -Matrices: Definition, Order of a matrix, Types of matrices Operations on matrices: Addition, Subtraction, Multiplication Properties of matrix: Various kind of Matrices, Transpose of a matrix . Elementary Transformations of Matrices and Rank of Matrices Symmetric and Skew Symmetric Matrices . Determinants, Minors, Cofactors, Inverse of a matrix.
UNIT 4 20 Hours	**Linear Algebra and Vector Operations**. Linear Independence: Characteristic equations, Eigenvalues, Eigenvector. Solving system of linear equations: Gauss Elimination Method, Gauss Jordan method, Gauss Siedel Methods. Vectors: Definition Magnitude of a vector, Types of Vectors, Vector addition. Dot products and Cross products. Vectors in 2- and 3-space 2.
Second series internal examination including theory + Laboratory if any	

Books/References

1. J.P. Tremblay, R. Manohar- Discrete Mathematical Structures with Applications to Computer Science, Tata McGraw Hill
2. Kenneth H Rosen - Discrete Mathematics and its Applications with Combinatorics ad graph Theory, Seventh Edition, McGraw Hill
3. Skills in Mathematics: Algebra, S.K.Goyal
4. Higher Engineering Mathematics, B S Grewal, Khanna Publishers
5. Higher Engineering Mathematics, Ramana, Tata McGraw Hill
6. Mathematics, P Kandasamy, S. Chand Group
7. Gilbert Strang, "Introduction to Linear Algebra", Wellesley-Cambridge Press, 2023.
8. Kenneth Hoffman, Ray Kunze, " Linear Algebra", Prentice Hall India Learning, 2015.
9. Gilbert Strang, "Calculus", Wellesley-Cambridge Press, 2023.
10. Joseph Edwards, "Differential Calculus for Beginners", Arihant Publications, 2016.
11. Joseph Edwards, " Integral Calculus for Beginners", Arihant Publications, 2016.

TEACHING LEARNING STRATEGIES

- Lecturing, case study/mini projects, Team Learning, presenting seminars on selected topics, Digital Learning

MODE OF TRANSACTION

- Lecture, Seminar, Discussion, Demonstration, Questioning and Answering, Video tutorial

ASSESSMENT RUBRICS

Refer to section 7

Semester II

KU2DSCMCA104: OBJECT ORIENTED PROGRAMMING USING C++

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100	KU2DSCMCA104	4	90

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
2	4	2	50	50	100	2

*** ESE Duration : 2 hours for theory and 3 hours for Lab**

Course Description:

This course provides an introduction to the principles and practices of object-oriented programming (OOP) using the C++ programming language. Students will learn fundamental concepts of OOP and how to apply them to develop software solutions using C++.

Course Objectives:

- Understand the principles of Object-Oriented Programming (OOP) using C++
- Master the syntax and semantics of the C++ programming language
- Gain proficiency in defining and utilizing classes and objects in C++
- Learn techniques for code reusability and flexibility through the use of templates and generic programming, along with mastering concepts like interface classes, operator overloading, and friend functions

Course Outcomes:

At the end of the Course, the Student will be able to:

SL #	Course Outcomes
CO1	Understand the fundamental principles of Object-Oriented Programming (OOP)
CO2	Gain a deep understanding of the concepts of inheritance, polymorphism, virtual functions.
CO3	Master the concept of interface classes and implementation inheritance and acquire proficiency in exception handling
CO4	Master the concept of file handling in C++ and learn the principles of file stream classes in the Standard Template Library (STL).

Mapping of COs to PSOs

CO - PSO Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✔	✔	✔	✔	✔
CO2	✔	✔	✔	✔	✔
CO3	✔	✔	✔	✔	✔
CO4	✔	✔	✔	✔	✔

COURSE CONTENT

UNIT 1 05 Hours Theory + 10 Hours Lab	Introduction to Programming Concepts, Overview of C++ and its Features, Writing Your First C++ Program, Structure of C++ program, Tokens, Keywords, identifiers, Variables, Data Types, Operators, manipulators, Basic Input/Output (cin, cout), type cast, type conversion, Control Structures: if-else, switch-case, loops (for, while, do-while), Introduction to Functions and Scope of Variables.
UNIT 2 10 Hours Theory + 20 Hours Lab	Detailed Study of Functions (Parameters, Return Types), Function Overloading, Introduction to Arrays and Strings, Basics of Pointers and References- Pointers to objects; Pointers to derived classes. Introduction to Object-Oriented Programming (OOP) Concepts, Classes and Objects: Definitions and Usage, Constructors and Destructors.

First series internal examination including theory + Laboratory if any	
UNIT 3 10 Hours Theory + 20 Hours Lab	Inheritance: Basics and Types, Polymorphism and Virtual Functions, Operator Overloading, Introduction to Templates (Basics), Working with the Standard Template Library (STL): Vectors, Lists, Introduction to Exception Handling.
UNIT 4 05 Hours Theory + 10 Hours Lab	C++ streams; stream classes; unformatted I/O operations; Formatted console I/O operations; Managing output with manipulators. Files – classes for file stream operations; Opening and closing a file; file modes; file pointers and their manipulations; Sequential input and output operation.
Second series internal examination including theory + Laboratory if any	
References: 1. 'Programming: Principles and Practice Using C++', Bjarne Stroustrup 2. Programming in C++, M.T. Somashekara, Prentice Hall of India, New Delhi 3. Object Oriented Programming with ANSI & Turbo C++, Ashok N. Kamthane, Pearson Education 4. Let us C++, Yeshwanth Kanethkar, BPB 5. Object Oriented Programming with C++; E. Balagurusamy; 3rd Edn; TMH 2006	

TEACHING LEARNING STRATEGIES

- Lecturing, case study/mini projects, Team Learning, presenting seminars on selected topics, Digital Learning

MODE OF TRANSACTION

- Lecture, Seminar, Discussion, Demonstration, Questioning and Answering, Video tutorial

KU2DSCMCA105 DIGITAL ELECTRONICS AND COMPUTER ORGANIZATION

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100	KU2DSCMCA105	4	60

Learning Approach (Hours/ Week)	Marks Distribution	

Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	Duration of ESE (Hours)
4	0	1	50	50	100	2

Course Description: Digital Electronics and Computer Organization is an introductory course that delves into the fundamental principles underlying modern digital systems and computer architecture. The course is designed to provide students with a comprehensive understanding of digital circuits, logic design, CPU architecture, and the organization of computer systems. Students will explore the concepts of binary arithmetic, Boolean algebra, Combinational and sequential logic, instruction execution, and CPU operation.

Course Objectives:

- Understand different number systems and Boolean algebra.
- Design of Combinational and sequential logic circuits
- Understand different Computer Instructions
- Understand concepts of register transfer logic and arithmetic operations.

Course Outcomes:

At the end of the Course, the Student will be able to:

SL #	Course Outcomes
CO1	Able to perform the conversion among different number systems.
CO2	Able to design Combinational and sequential logic circuits
CO3	To present the Digital fundamentals, Boolean algebra and its applications in digital systems
CO4	To familiarize with the design of various digital circuits using logic gates

Mapping of COs to PSOs

CO - PSO Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✔	✔	✔	✔	✔
CO2	✔	✔	✔	✔	✔
CO3	✔	✔	✔	✔	✔
CO4	✔	✔	✔	✔	✔

COURSE CONTENT

UNIT 1 **05 Hours**	Number Systems – Decimal, Binary, Octal, Hexadecimal number, Number Conversion, binary arithmetic, 1's and 2's complement arithmetic, BCD arithmetic, Boolean Laws: Commutative Laws, Associative Laws and Distributive Laws, Boolean Theorems, Sum of Products and Product of Sums.
UNIT 2 **10 Hours**	De-Morgan's Laws, Digital Logic Gates:-AND, OR, NOT,XOR,XNOR functions, Universal Logic Gates: NAND and NOR gates, Realization of Boolean expressions using logic gates, Circuit simplification using Boolean Algebra, Logic Diagrams, Combinational Logic Circuits, Simplification of Logic functions, Karnaugh map simplification.
First series internal examination including theory + Laboratory if any	
UNIT 3 **20 Hours**	Multiplexer, and De-multiplexer: Truth table and logic expression, Implementation using logic gates, Design of Half adder and full adder, Construction of full adder using half-adders, Decoder, Encoder, Digital to analog converter, Analog to digital converter.
UNIT 4 **25 Hours**	Concept of Flip-flops, SR latch, Gated SR latch, Shift Registers, Serial in – Serial out Shift Register (SISO), Serial In – Parallel out shift Register (SIPO), Parallel in – Parallel out Shift Register (PIPO), Parallel in – Serial out Shift Register (PISO), Bidirectional Shift Registers, Accessing I/O Devices, Interrupts – Interrupt Hardware, Direct Memory Access, Buses, Basic concepts of Pipe lining. (25 hours)
Second series internal examination including theory + Laboratory if any	
UNIT X	**Module X:** Instruction formats, Instruction sets, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, memory organization: Memory Hierarchy, Main memory, Auxiliary memory, Associate memory, Cache memory, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC),Register Transfer Language, Register Transfer, Bus and Memory Transfers.
Books/References	

1. M. Morris Mano, Michael D. Ciletti, “Digital Design”, Pearson, 2013.
2. A. K. Maini, “Digital Electronics: Principles, Devices And Applications, Wiley, 2007.
3. R. Gaonkar, “Microprocessor Architecture, Programming and Applications with the 8085”, Prentice Hall, 2014.
4. "Digital Design and Computer Architecture" by David Harris and Sarah Harris.

TEACHING LEARNING STRATEGIES

- Lecturing, case study/mini projects, Team Learning, presenting seminars on selected topics, Digital Learning

MODE OF TRANSACTION

- Lecture, Seminar, Discussion, Demonstration, Questioning and Answering, Video tutorial

ASSESSMENT RUBRICS

Refer to section 7

KU2DSCMCA106: STATISTICAL FOUNDATIONS FOR COMPUTER APPLICATIONS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100	KU2DSCMCA106	4	60

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
4	0	1	50	50	100	2

Course Description: The course on probability and statistics covers fundamental topics including descriptive statistics (measures of central tendency and dispersion), probability theory (events, sample spaces, probability laws, random variables, and distributions), inferential statistics (regression analysis), and applications in various fields such as science, engineering, economics, and social sciences, emphasizing critical thinking, data analysis, and problem-solving skills.

Course Objectives:

- Understand fundamental statistical methods for evaluating data samples
- Familiarises the concept of descriptive statistics
- Understand the concept of probability and its applications
- Analysing the data using various statistical methods.

Course Outcomes:

At the end of the Course, the Student will be able to:

SL #	Course Outcomes
CO1	Apply fundamental statistics concepts
CO2	Analyze data using descriptive statistics
CO3	Apply probability and statistics in real-world situations
CO4	Communicate statistical findings effectively

Mapping of COs to PSOs

CO - PSO Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✔	✔	✔	✔	✔
CO2	✔	✔	✔	✔	✔
CO3	✔	✔	✔	✔	✔
CO4	✔	✔	✔	✔	✔

COURSE CONTENT

UNIT 1 **05 Hours**	Statistical methods: Concepts of statistical population and sample. Collection of Data: Primary and Secondary Data, Methods of Collecting Primary Data. Measures of Central Tendency: Characteristics of a good measure of central tendency, Mean, median, mode, harmonic mean,

	geometric mean, weighted mean. Measures of Dispersion: Range, quartile deviation, mean deviation, standard deviation and variance. **[05 Hours]**
UNIT 2 **15 Hours**	Random experiment, sample space and events, impossible events, mutually exclusive and exhaustive events, independent and dependent events, equally likely events with examples, Operation of events (Union, Intersection, Complement of Events), Definitions of probabilities, Axioms of probability, De'Morgans Law, Theorems of probability - Addition Theorem, Multiplication, Conditional probability, Baye's Theorem. **[15 Hours]**
First series internal examination including theory + Laboratory if any	
UNIT 3 **20 Hours**	Basic principles of sample surveys, advantages of sample survey over census, sampling and non-sampling errors , probability sampling, judgment sampling and non-probability sampling, Simple Random Sampling, Systematic Sampling, Stratified Sampling, Cluster Sampling, Multistage sampling **[20 Hours]**
UNIT 4 **20 Hours**	Correlation analysis - Definition and properties of correlation coefficient, Pearson's Coefficient of Correlation , Rank correlation coefficient, Method of least squares and Fitting of Straight Line , Scatter diagram, Regression analysis - linear regression, fitting of regression lines, regression coefficients and their properties, relation between correlation and regression coefficients. **[20 Hours]**
Second series internal examination including theory + Laboratory if any	

Books/References:

1. B L Agrawal (2013): Basic Statistics – New Age International Publishers.
2. Probability and Statistics for Computer Scientists by Michael Baron
3. Gupta, S.P. Statistical Methods. Sultan Chand and Sons: New Delhi
4. Gupta, S. C. and Kapoor, V. K. (2020)Fundamentals of Mathematical Statistics. Sultan Chand and Sons' Publishers, New Delhi.
5. Probability and Statistics for Engineers, Miller I Freund J E, Prentice Hall of India
6. Statistics for Management, Levin R I, Prentice Hall of India

TEACHING LEARNING STRATEGIES

- Lecturing, case study/mini projects, Team Learning, presenting seminars on selected topics, Digital Learning

MODE OF TRANSACTION

- Lecture, Seminar, Discussion, Demonstration, Questioning and Answering, Video tutorial

ASSESSMENT RUBRICS

Refer to section 7

KU2DSCMCA107: DATABASE MANAGEMENT SYSTEMS

Semester	Course Type	Course Level	Course Code	Credits	Total Hours
2	DSC	100	KU2DSCMCA107	4	90

Learning Approach (Hours/ Week)			Marks Distribution			Duration of ESE (Hours)
Lecture	Practical/ Internship	Tutorial	CE	ESE	Total	
2	4	2	50	50	100	2

*** ESE Duration: 2 hours for theory and 3 hours for Lab**

Course Description: This course provides a comprehensive study of database management systems (DBMS), covering both theoretical concepts and practical implementations. Students will gain an understanding of the fundamental principles underlying the design, implementation, and management of modern database systems.

Course Objectives:

- Understand the fundamental concepts of database systems
- Learn about the relational data model, including relations, keys, and referential integrity
- Develop a solid understanding of relational algebra operators and their application in querying databases
- Learn SQL (Structured Query Language)
- Learn about the normalization process and the desirable properties of decompositions up to BCNF
- Understand transaction management, concurrency control, and error recovery mechanisms in database systems

Course Outcomes:

At the end of the Course, the Student will be able to:

SL #	Course Outcomes
CO1	Understand the fundamental concepts of database systems
CO2	Develop proficiency in developing queries and subqueries
CO3	Gain a deep understanding of the definitions and properties of 1NF, 2NF, 3NF, and BCNF
CO4	Equips students with the knowledge and skills necessary to design, implement, and manage transaction processing systems effectively

Mapping of COs to PSOs

CO - PSO Mapping					
	PSO1	**PSO2**	**PSO3**	**PSO4**	**PSO5**
CO1	✔	✔	✔	✔	✔
CO2	✔	✔	✔	✔	✔
CO3	✔	✔	✔	✔	✔
CO4	✔	✔	✔	✔	✔

COURSE CONTENT

UNIT 1 **05 Hours**	Introduction to database systems, Data Abstraction and System structure, View of Data, Data Models, database structure, DBA, Data Base Users. E-R model, Basic concepts; design issues; Conceptual data modeling - entities, entity types, various types of attributes, relationships, relationship types, E/R diagram notation. Mapping Constraints; Relational Data Model - Concept of relations, keys: Primary, Foreign, candidate, referential integrity and foreign keys.
UNIT 2 **07 Hours** **25 Hours**	Relational algebra operators, various types of joins, set operation, division, example queries, tuple relational calculus, domain relational calculus. SQL - Introduction, data definition in SQL, table. Querying in SQL - basic select-from-where block and its semantics, nested queries - correlated and uncorrelated, notion of aggregation, aggregation functions group by and having clauses. DDL, DML, DCL, SQL Functions, Data types in SQL. Developing queries and subqueries
First series internal examination including theory + Laboratory if any	

UNIT 3 **10 Hours Theory + 25 Hours Lab**	Dependencies and Normal forms - Problems encountered with bad schema designs, motivation for normal forms, dependency theory - functional dependencies, Armstrong's axioms for FD's, closure of a set of FDs, minimal covers, definitions of 1NF, 2NF, 3NF and BCNF, decompositions and desirable properties of them, multi-valued dependencies and 4NF, join dependencies and definition of 5NF.
UNIT 4 **08 Hours Theory + 10 Hours Lab**	Integrity constraints, views, Trigger and Sequences, Relational model – Structure of Transaction processing and Error recovery - ACID properties. Transactions and Schedules – Characterizing Schedules based on Recoverability, Serializability of schedules. Concurrency Control in databases: Locking Techniques-Timestamp ordering, Multi version concurrency Control – Granularity of data items, error recovery and logging, undo, redo, undo-redo logging and recovery methods.
UNIT X	Overview and History of NoSQL Databases. Definition of the Four Types of NoSQL Databases, NoSQL Key/Value databases, Document Databases, Document oriented Database Features, Graph data model, Column family data model
Second series internal examination including theory + Laboratory if any	
Books/References: 1. H Silbersehatz, Korth and Sudarshan, Database system concepts, 6th edition MGH 2011 Ramakrishnan and Gehrke, Database Management Systems, 3rd Edn, Mc Graw Hill, 2003 Elmasri and Navathe, Fundamentals of Database systems, 5th Edition, Pearson 2009 C.J.Date-A.Kannan, S.Swamynathan, An introduction to Database System, 8th Edition, Pearson education O'Reilly, Practical PostgreSQL Shroff Publishers (SPD) 2002. Redmond, E. & Wilson, J. (2012). Seven Databases in Seven Weeks: A Guide to Modern Databases and the NoSQL Movement (1st Ed.). Raleigh, NC: The Pragmatic Programmers, LLC. ISBN-13: 978-1934356920 ISBN-10: 1934356921	

TEACHING LEARNING STRATEGIES

- Lecturing, Demonstration, Digital Learning, Team Work

MODE OF TRANSACTION

- Lecture, Seminar, Discussion

ASSESSMENT RUBRICS

Refer to section 7