

MGM University

Vision

- To ensure sustainable human development which encourages self-reliant and self-content society.
- To promote activities related to community services, social welfare and also Indian heritage and culture.
- To inculcate the culture of non-violence and truthfulness through vipassanna meditation and Gandhian Philosophy.
- To develop the culture of simple living and high thinking

Mission

- To impart state of art education and technical expertise to students and give necessary training to teachers to create self-reliant society for future.
- To encourage students to participate in Indian and International activities in sports, literature, etc. so that future generation becomes base for free and liberal society
- To educate students in areas like Management, Finance, Human relations to inculcate philosophy of simple living and high thinking value of simple economic society.
- To inculcate culture of non-violence and truthfulness through Vipassana.

To sustain activities of Indian culture (viz. classical dance, music and fine arts) through establishing institutes like Mahagami, Naturopathy, etc.

विद्यापीठ गीत

अत्त दिप भव भव प्रदिप भव,

स्वरूप रूप भव हो

ज्ञान सब्ब विज्ञान सब्ब भव ,

सब्ब दिप भव हो

अत्ताहि अत्त नो नाथो ,

अत्ताहि अत्त नो गति

अत्त मार्गपर अप्रमादसे है तुझे चलना

सब्ब का कल्याण हो ,

वो कार्यकुशल करना

सब्ब का उत्तम मंगल , पथप्रदर्शक हो

अत्त दिप भव भव प्रदिप भव ,

स्वरूप रूप भव हो

ज्ञान सब्ब विज्ञान सब्ब भव ,

सब्ब दिप भव हो

बुद्धमं शरनं गच्छामि :

धम्मं शरनं गच्छामि :

संघं शरनं गच्छामि :

Dr. G. Y. Pathrikar College of Computer Science & Information Technology

MGM college of Computer Science and Information Technology was established in 2001 offering undergraduate and postgraduate degree program in Computer Science and Information Technology. College was renamed as Dr.G.Y.Pathrikar College of Computer Science and Information Technology in 2003 in memory of great educationalist, one of the founder member and Ex-Secretary MGM, Dr.G.Y.Pathrikar Sir.

It is first self-financed ISO certified institution offering program dedicated to Computer science and Information technology in Maharashtra and has achieved status of 2f/12b. Ours was the only and first college to be re-accredited as A+ grade with NAAC in the year 2017. Experienced and qualified faculty with Ph.D is strength of our college. Starting with 77 student's College has crossed total students strength of 10,000 passing out. Student are doing well in various MNCs like Infosys, Tech-Mahindra, Wipro, Capgemini, Cognizant etc. Many have their own Startups. Some of the students have completed their Masters and Ph.D. program from foreign countries like US, UK, Australia. Now we are constituent college of MGM University, Chhatrapati Sambhajanagar.

Vision

To be an academic institution in dynamic equilibrium in social, ecological and economical environment striving continuously for excellence in total quality education, research and technological service to the nation.

Mission

- To create and sustain a community of learning in which students acquire knowledge and learn to apply it professionally with due consideration for ethical, and economical issues.
- To upgrade our students in all respect with the help of latest infrastructure in the area of Computer Science and Information Technology in order to build the National Capabilities.
- To understand the culture of Non-violance, truth, peace through Gandhian Philosophy.

Programs offered at Dr. G. Y. Pathrikar College of Computer Science & Information Technology

Undergraduate Programmes	Postgraduate Programmes	PhD Programmes
B.Sc(Computer Science) Honours / Honours with Research	M.Sc. (Computer Science)	Ph.D. in Computer Science and Information Technology
B.Sc(Information Technology) Honours/ Honours with Research	M.Sc. (Information Technology)	
BCA(Science) Honours / Honours with Research	M.Sc. (Data Science)	
B.Sc(Animation) Honours / Honours with Research	M.Sc. (Animation)	
Integrated M.Sc. Data Science		
BCA(Digital Marketing) Honours		
B.Sc(Robotics) Honours		

Name of Program – B.Sc. (Computer Science) Honours / Honours with Research

Duration – Four Years

Eligibility -

- He / She Must have passed the Higher Secondary (Multipurpose) Examination conducted by H.S.C. Board Government of Maharashtra with Science / Technical Subjects or an Examination of any statutory University and Board recognized as equivalent thereto.

OR

- Candidates having offered prescribed vocational courses, (MCVC) with Computer Techniques / Information Technology / Electronics.

OR

- Three Years Course in Diploma Engineering conducted by the Board of Technical Education, Maharashtra State. He / She must have passed at qualifying examination.

MGM UNIVERSITY

Name of Faculty: Faculty of Basic and Applied Sciences

Name of the College: Dr.G.Y.Pathrikar College of Computer Science and Information Technology

Name of the Programme: B.Sc. (Computer Science) Honours / Honours with Research

Programme Type (UG/PG): UG

Duration: 04 Years (08 Semesters)

List of Options to select from Bucket of Courses provided in various categories:

Major	
Computer Science	
Core Major	Core Elective

Minor options for basic and applied science Faculty	GYP	IBT	UDBAS
	Cyber Security	Food Technology and Processing	Chemistry
	Robotics	Microbiology	Geo-Informatics
	Data Analytics	Biotechnology	Mathematics
	Block-Chain Technologies	Bioinformatics	Statistics
		Food Nutrition and Dietetics	Material Science

Minor options from Other Faculty	Faculty of Engineering and Technology	Faculty of Social Sciences & Humanities	Faculty of Design	Faculty of Management and Commerce	Interdisciplinary Faculty	Performing Arts
	Data Science	Filmmaking	Product Design	Financial Management	Cosmetic Technology	Theatre Arts
	IoT	Photography	Interior Design	E-Commerce	Education	Dance
	Geo-informatics and Applications	Mass Communication and Journalism	Contemporary Arts	International Business Management	Yog Sciences	Music
	EV Technology	Psychology	Visual Communication	Hospitality Mgmt	Physical Education	Folk Art
	Drone Technology	Economics	Fashion Technology	Travel and Tourism	Home Science	
	Robotics Technology	English		Art of Leadership		
	Chemical Technology	Social Work		Art of Business		
	AI&ML					
	Universal Human Values					
Energy management						

First Year - Semester I												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML101	Operating System	Theory	2	2		30	20	50		08	20
MM	CSC41MML102	Data Structure	Theory	2	2		30	20	50		08	20
MM	CSC41MMP101	Practical on Operating System	Practical	1		2	30	20	50		08	20
MM	CSC41MMP102	Practical on Data Structure	Practical	1		2	30	20	50		08	20
IKS	CSC41IKT101	Indian Psychology and yoga	Theory	2	2	-	30	20	50		08	20
AEC		Basket of AEC From University	Theory	2	2	-	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		08	20
VSC	CSC41VSP101	Programming in C	Practical	2		4	30	20	50		08	20
SEC	CSC 41SEL101	Computer System Architecture	Theory	2	2	-	30	20	50		08	20
VEC	CSC41MML101	Basket of VEC From University	Theory	2	2	-	30	20	50		08	20
CC	CSC41MML102	Basket of CC From University	Practical	2		4	30	20	50		08	20
Total				22	16	12	360	240	600			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation ,**Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

First Year- Semester II												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML103	Data Base Management System	Theory	2	2		30	20	50		08	20
MM	CSC41MML104	Microprocessor	Theory	2	2		30	20	50		08	20
MM	CSC41MMP103	Practical on Data Base Management System	Practical	1		2	30	20	50		08	20
MM	CSC41MMP104	Practical on Microprocessor	Practical	1		2	30	20	50		08	20
MI		Basket of MI From University	Theory	2	2		30	20	50		08	20
AEC		Basket of AEC From University	Theory	2	2		30	20	50		08	20
OE		Basket of OE From University	Theory	2	2		30	20	50		08	20
OE		Basket of OE From University	Theory	2	2		30	20	50		08	20
VSC	CSC41VSP102	Object Oriented Programming in C++	Practical	2		4	30	20	50		08	20
SEC	CSC41SEL102	Internet of Things	Theory	2	2		30	20	50		08	20
VEC	CSC41MML103	Basket of VEC From University	Theory	2	2		30	20	50		08	20
CC	CSC41MML104	Basket of CC From University	Practical	2		4	30	20	50		08	20
Total				22	16	12	390	260	650			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, Course Category: MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Second Year- Semester III												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML201	Data Communication Network-I	Theory	2	2	-	30	20	50		08	20
MM	CSC41MML202	Computer Graphics	Theory	2	2	-	30	20	50		08	20
MM	CSC41MML203	Statistical Method	Theory	2	2	-	30	20	50		08	20
MM	CSC41MMP201	Practical on Data Communication Network-I	Practical	1	-	2	30	20	50		08	20
MM	CSC41MMP202	Practical on Computer Graphics	Practical	1	-	2	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2	-	30	20	50		08	20
MI		Basket of MI From University	Theory	3	2	-	60	40	100		08	20
MI		Basket of MI From University	Practical	1	-	2	30	20	50		08	20
AEC		Basket of AEC From University	Theory	2	2	-	30	20	50		08	20
VSC	CSC41VSP201	Programming in Java	Practical	2		4	30	20	50		08	20
FP	CSC41FPJ201	Field Project	Project	2		4	30	20	50		08	20
CC		Basket of CC From University	Practical	2		4	30	20	50		08	20
Total				22	12	18	390	260	650			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Second Year- Semester IV												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML204	Software Engineering	Theory	2	2		30	20	50		08	20
MM	CSC41MML205	Numerical Computational Technique	Theory	2	2		30	20	50		08	20
MM	CSC41MML206	Data Communication Network II	Theory	2	2		30	20	50		08	20
MM	CSC41MMP203	Practical on Software Engineering	Practical	1		2	30	20	50		08	20
MM	CSC41MMP204	Practical on Numerical Computational Technique	Practical	1		2	30	20	50		08	20
OE		Basket of OE From University	Theory	2	2		30	20	50		08	20
MI		Basket of MI From University	Theory	3	2		60	40	100		16	40
MI		Basket of MI From University	Practical	1		2	30	20	50		08	20
AEC		Basket of AEC From University	Theory	2	2		30	20	50		08	20
SEC	CSC41SEP201	Web Programming	Practical	2		4	30	20	50		08	20
CEP	CSC41CEP201	Community Engagement Program(As Per University Guidelines)	Practical	2		4	30	20	50		08	20
CC		Basket of CC From University	Practical	2		4	30	20	50		08	20
Total				22	12	18	390	260	650			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, Course Category: MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Third Year- Semester V												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML301	Cloud Computing	Theory	2	2		30	20	50		08	20
MM	CSC41MML302	Machine Learning	Theory	2	2		30	20	50		08	20
MM	CSC41MML303	Introduction to Robotics	Theory	2	2		30	20	50		08	20
MM	CSC41MMP301	Practical Based on Cloud Computing	Practical	1		2	30	20	50		08	20
MM	CSC41MMP302	Practical Based on Machine Learning	Practical	1		2	30	20	50		08	20
ME	CSC41MEL301	Artificial Intelligence	Theory	3	3		60	40	100		16	40
	CSC41MEL302	Blockchain Technology	Theory	3	3		60	40	100		16	40
ME	CSC41MEP301	Practical Based on Artificial Intelligence	Practical	1		2	30	20	50		08	20
	CSC41MEP302	Practical Based on Blockchain Technology.	Practical	1		2	30	20	50		08	20
MI		Basket of MI From University	Theory	3	2		60	40	100		16	40
MI		Basket of MI From University	Practical	1		2	30	20	50		08	20
VSC	CSC41VSP301	Python Programming	Practical	2		4	30	20	50		08	20
FP	CSC41FPJ301	Field Project	Project	2		4	30	20	50		08	20
Total				20	14	16	390	260	650			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, Course Category: MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Third Year- Semester VI												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML304	Digital Image Processing	Theory	2	2		30	20	50		08	20
MM	CSC41MML305	Deep Learning	Theory	2	2		30	20	50		08	20
MM	CSC41MML306	Theory of Computation	Theory	2	2		30	20	50		08	20
MM	CSC41MMP303	Practical on Digital Image Processing	Practical	1		2	30	20	50		08	20
MM	CSC41MMP304	Practical on Deep Learning	Practical	1		2	30	20	50		08	20
ME	CSC41MEL303	Software cost estimation	Theory	3	3		60	40	100		16	40
	CSC41MEL304	Data Analytics	Theory	3	3		60	40	100		16	40
ME	CSC41MEP303	Practical Based on Software cost estimation	Practical	1		2	30	20	50		08	20
	CSC41MEP304	Practical Based on Data Analytics	Practical	1		2	30	20	50		08	20
MI		Basket of MI From University	Theory	3	2		60	40	100		16	40
MI		Basket of MI From University	Practical	1		2	30	20	50		08	20
OJT	CSC41JTP301	On Job Training	Practical	4		8	30	20	50		08	20
Total				20	11	18	360	120	600			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Fourth Year- Semester VII												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML401	Neural Network	Theory	3	3		60	40	100		16	40
MM	CSC41MML402	Data Ware Housing and Data Mining	Theory	3	3		60	40	100		16	40
MM	CSC41MML403	Network Security	Theory	3	3		60	40	100		16	40
MM	CSC41MMP401	Practical based on Neural Network	Practical	1		2	30	20	50		08	20
MM	CSC41MMP402	Practical on Data Ware Housing and Data Mining	Practical	1		2	30	20	50		08	20
MM	CSC41MMP403	Practical Based on Network Security	Practical	1		2	30	20	50		08	20
ME	CSC41MEL401	Geographical Information System	Theory	3	3		60	40	100		16	40
	CSC41MEL402	Remote Sensing	Theory	3	3		60	40	100		16	40
ME	CSC41MEP401	Practical Based on Geographical Information System	Practical	1		2	30	20	50		08	20
	CSC41MEP402	Practical Based on Remote Sensing	Practical	1		2	30	20	50		08	20
RM	CSC41RML401	Research Methodology	Theory	3	3		60	40	100		16	40
RM	CSC41RMP401	Practical based on Research Methodology	Practical	1		2	30	20	50		08	20
Total				20	18	10	450	300	750			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Fourth Year- Semester VIII												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML404	Biometric Technique	Theory	3	3		60	40	100		16	40
MM	CSC41MML405	Quantum Computing	Theory	3	3		60	40	100		16	40
MM	CSC41MML406	Software Testing	Theory	3	3		60	40	100		16	40
MM	CSC41MMP404	Practical on Biometric Technique	Practical	1		2	30	20	50		08	20
MM	CSC41MMP405	Practical on Quantum Computing	Practical	1		2	30	20	50		08	20
MM	CSC41MMP406	Practical on Cyber Security	Practical	1		2	30	20	50		08	20
ME	CSC41MEL403	Cyber Security	Theory	3	3		60	40	100		16	40
	CSC41MEL404	Augmented Reality	Theory	3	3		60	40	100		16	40
ME	CSC41MEP403	Practical Based on Cyber Security	Practical	1		2	30	20	50		08	20
	CSC41MEP404	Practical Based on Augmented Reality	Practical	1		2	30	20	50		08	20
OJT	CSC41JTP401	On job Training	Practical	4		8	60	40	100		16	40
Total				20	12	16	420	280	700			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Fourth Year- Semester VII (Honours with Research)												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML407	Medical Image Processing	Theory	3	3		60	40	100		16	40
MM	CSC41MML408	Pattern Recognition	Theory	3	3		60	40	100		16	40
MM	CSC41MMP406	Practical on Medical Image Processing	Practical	1		2	30	20	50		08	20
MM	CSC41MMP407	Practical on Pattern Recognition	Practical	1		2	30	20	50		08	20
ME	CSC41MEL405	Human Computer Interaction	Theory	3	3		60	40	100		16	40
	CSC41MEL406	Data Analytics	Theory	3	3		60	40	100		16	40
ME	CSC41MEP405	Practical Based on Human Computer Interaction	Practical	1		2	30	20	50		08	20
	CSC41MEP406	Practical based on Data Analytics	Practical	1		2	30	20	50		08	20
RM	CSC41RML401	Research Methodology	Theory	3	3		60	40	100		16	40
RM	CSC41RMP401	Practical based on Research Methodology	Practical	1		2	30	20	50		08	20
RP	CSC41RPJ401	Research Project	Practical	4		8	60	40	100		16	40
Total				20	12	16	420	280	700			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research project

Fourth Year- Semester VIII (Honours with Research)												
Course Category	Course Code	Course Title	Nature of Course	No. of Credits	Teaching (Contact hrs/ week)		Evaluation Scheme (Marks)			Minimum Passing (Marks)		
					L	P	Internal	External	Total	Internal	External	Total
MM	CSC41MML408	Biometric Technique	Theory	3	3		60	40	100		16	40
MM	CSC41MML409	Biomedical Image and Visualization	Theory	3	3		60	40	100		16	40
MM	CSC41MMP408	Practical base on Biometric Technique	Practical	1		2	30	20	50		08	20
MM	CSC41MMP409	Practical based on Biomedical Image and Visualization	Practical	1		2	30	20	50		08	20
ME	CSC41MEL407	Natural Language Processing	Theory	3	3		60	40	100		16	40
	CSC41MEL408	Fuzzy Logic	Theory	3	3		60	40	100		16	40
ME	CSC41MEP407	Practical Based on Natural Language Processing	Practical	1		2	30	20	50		08	20
	CSC41MEP408	Practical Based on Fuzzy Logic	Practical	1		2	30	20	50		08	20
RP	CSC41RPJ402	Research Project	Practical	8		16	120	80	200		32	80
Total				20	09	22	390	260	650			

Note:

Nature of Course : L- Lecture, P-Practical, S-Seminar, J-Project, I-Internship, D-Dissertation, **Course Category:** MM-Major Mandatory, ME-Major Elective, MI-Minor, OE-Generic / Open electives, VSC-Vocational skill course, SEC-Skill Enhancement course, AEC-Ability Enhancement course, IKS-Indian Knowledge system, VEC-Value Education course, OJT-On Job Training / Internship / Apprenticeship, FP-Field project, CEP-Community engagement and service, CC-Co – curricular course, RM-Research methodology, RP-Research projec

Syllabus Semester-I

Course code: CSC41MML101 **Course name:** Operating System **Course category:** Major Mandatory
Credits: 2

Course Objectives: Student can understand the concept to process management and scheduling, and various use in Inter Process Communication and the role of OS in interprocess communication

Course Outcomes: At the end of the course, the students will be able to -

CO1: Understand the process management policies and scheduling of processes by CPU

CO2: Understand the need for process synchronization and coordination handled by operating system

CO3: Describe and analyze the memory management and its allocation policies

CO4: Understand the use and evaluate the storage management Policies with respect to different storage management Technologies.

Contents –

Unit	Content	Teaching hours
1	<p>Introduction: Concept of Operating System, History of Operating System, Operating System Structure, Types of Operating System, Function of Operating System, Components of Operating system</p> <p>Process Management: Concept of Process, Process States, Process, Scheduling, operation on process Inter process communication</p> <p>Asynchronous Concurrent Process Parallel Processing, Mutual Exclusion and Critical Section, threading Dekker's Algorithm, Petersons algorithm, Hardware Solution to Mutual Exclusion, semaphores, implementation of semaphores P and V.</p>	10
2	<p>Concurrent Programming: Monitors, Deadlock concept, Four Necessary condition for deadlock Deadlock Presentation, Deadlock avoidance, deadlock detection, deadlock recovery</p> <p>Memory Management: Swapping, Contiguous Memory allocation, paging, Structure of the Page Table, Segmentation, Example, the Intel Pentium,</p>	10
3	<p>Virtual Memory Management: Demand Paging, copy on write, Page replacement, allocation of Frames, thrashing, Memory Map Files, Allocating Kernel Memory</p> <p>Device Management: Techniques for device management, Device Characteristics, Device Allocation Considerations, Virtual Devices</p>	10

Text Books:

- Operating System**, Stuart E. Mandnick, John J. Donovan Tata McGraw Hill Publication.
- Operating System**, H.M. Deitel, Pearson Publication

Reference Books:

- Operating System**, Abraham Silberschatz, Peter B. Galvin, Wiley Publication.
- Operating System**, Andrew S. Tanenbaum, Pearson Publication.

Online Resources: 1. NPTEL / SWAYAM lectures.

Syllabus Semester-I

Course code: CSC41MML102 **Course name:** Data Structure **Course category:** Major Mandatory
Credits: 2

Course Objectives: To introduce the concept of data structures and Algorithm, emphasize the importance of data structures in development and implementation of algorithms in Computer Programming.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Describe how arrays, records, linked structures, stacks, queues, trees, are represented in memory and used by algorithms.

CO2: Describe common applications for arrays, records, linked structures, stacks, queues, trees.

CO3: Demonstrate different methods for traversing trees.

CO4: Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data.

Contents –

Unit	Content	Teaching hours
1	Introduction: Basic Terminology, Data Item, fields, Records, Files, Entity, Attributes, Data organization and Data Structure. Arrays: Representation of Linear Arrays, Traversing, Insertion and Deletions, sorting and Searching Algorithms, Multidimensional Arrays 2D and M-D concept, Record, Record Structure, Representation in Memory.	10
2	Linked List: Concept of linked List, Representation of linked list in Memory, Traversing a linked list, Searching a linked List: Sorted and Unsorted, Insertion and Deletion in Linked list, Header linked list and Two way list. Stacks and Queue: Operation, Array Representation of Stack Linked Reorientation of Stack, Queue, Representation of Queues, Types of queue	10
3	Binary Tree: Representing Binary trees in memory, Traversing Binary trees, Traversal Algorithm using Stack, Header node, Threads, Binary Search Tree Searching and Inserting in Binary search Trees, Deleting in Binary Search Trees.	10

Text Books: 1. **Data Structure** , Seymour Lipschutz , TataMcGraw-Hill Publication

Reference Books:

1. **Data Structure**, Tannenbaum, PHI Publication

2. **An Introduction to Data Structure and Application**, Jean Paul Tremblay, Tata McGraw-Hill Publication

3. **Introduction to Algorithms**, Thomas H.Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford, PHI Publication

Online Resources: 1. NPTEL / SWAYAM lectures.

Semester-I

Course code: CSC41MMP101 **Course name:** Practical on Operating System **Course category:** Major Mandatory **Credits:** 1

Course Objectives: To be familiar with various scheduling and Memory management techniques

Course Outcomes: At the end of the course, the students will be able to -

CO1: Understand function of operating system.

CO2: Understand file system on operating system.

CO3: Implementation of simulate paging Technique of memory management.

Contents –

Unit	Content	Teaching hours
1	Experiment No. 1 : Introduction to OS and Types of OS	1
2	Experiment No. 2 : System Calls	1
3	Experiment No. 3: Threads	1
4	Experiment No. 4 : Memory Mapped Files	1
5	Experiment No.5 :Semaphores using Shared Memory	1
6	Experiment No.6 : File System	1
7	Experiment No. 7: Structure of Page table, Segmentation. Example : the Intel Pentium	1
8	Experiment No.8: Write a C program to simulate producer- Consumer problem using semaphores.	1
9	Experiment No 9: Write a C program to simulate paging Technique of memory management.	1
10	Experiment No. 10 : Write a C program to simulate Bankers algorithm for the purpose of deadlock Avoidance	1

Text Books: 1.Operating System, Stuart E. Mandnick, JohnJ. Donovan Tata McGraw Hill Publication

Reference Books: 1.Operating System, Andrew S.Tanenbaum, Pearson Publication

Online Resources: 1. NPTEL / SWAYAM lectures.

Semester-I

Course code: CSC41MMP102 **Course name:** Practical on Data Structure **Course category:** Major Mandatory **Credits:** 1

Pre-requisites: Basic knowledge of Computer Programming

Course Objectives: To familiar with linear and non linear Data Structure

Course Outcomes: At the end of the course, the students will be able to -

CO1: Understand Linear and Non linear structure.

CO2: Understand various operation perform on data structure.

Contents –

Unit	Content	Teaching hours
1	To demonstrate the concept of one dimensional array finding the sum of array elements.	1
2	To insert an element in an array.	1
3	To delete an element from an array	1
4	To add two matrix A and B.	1
5	To multiply two matrix A and B	1
6	To Concatenate two string.	1
7	To copy a string into another string.	1
8	Implementation of linked list using array.	1
9	Implementation of stack using array.	1
10	Implementation of queue using array.	1

Text Books: 1. **Data Structure** , Seymour Lipschutz , TataMcGraw-Hill Publication

Reference Books: 1. **Introduction to Algorithms**, Thomas H.Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford, PHI Publication

Online Resources: 1. NPTEL / SWAYAM lectures.

Semester-I**Course code:** CSC41VSP101**Course name:** Practical on Programming in C**Course category:** Value Education course**Credits:** 1**Pre-requisites:** Basic knowledge of C Programming**Course Objectives:** To introduce the foundations of computing, programming and problem- solving using computer Programming and its principles.**Course Outcomes:** At the end of the course, the students will be able to -**CO1:** Understand various function in c programming**CO2:** Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task .**Contents –**

Unit	Content	Teaching hours
1	Program to find Simple Interest	1
2	Program to find smallest of two numbers using conditional operator.	1
3	Program to perform factorial of a given number.	1
4	Program to find the given number is palindrome or not.	1
5	Program to find the given number is Armstrong or not.	1
6	Program to reverse the given number.	1
7	Program to find Sum of digits.	1
8	Program to find day of the week.	1
9	Program to find the given character is vowel or not.	1
10	Write a macro that returns TRUE if its parameter is divisible by 10 and FALSE otherwise.	1

Text Books: 1. **Let us C** ,Y.P. Kanetkar, BPB publication**Reference Books:** 1. **Programming in C**, E. Balaburuswamy ,Tata Macgraw Hill**Online Resources:** NPTEL / SWAYAM lectures.

Syllabus Semester-I

Course code: CSC41SEL101

Course name: Computer System Architecture

Course category: Skill Enhancement course **Credits:** 2

Pre-requisites: Basic knowledge of Digital Electronic

Course Objectives: To convey basic introduction of computer system architecture, the structure of computer, Working gates and its functionality.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Student will be able to learn basic concepts of digital logic.

CO2: Student will be able to learn basic concepts of digital logic.

Contents –

Unit	Content	Teaching hours
1	Data Types: Number Systems, Octal and Hexadecimal Numbers, Decimal Representation, Alphanumeric Representation, 1's Complement, 2's Complement, Subtraction of Unsigned Numbers	10
2	Introduction: Digital Computers, Logic Gates, Boolean Algebra, Complement of Function, Karnaugh's Map: Map Simplification, Product of Sums Simplification Don't Care Conditions. Combinational Circuits: Half Adder, Full Adder, 4-Bit Binary Adder, Half Subtractor and Full Subtractor	10
3	Flip Flops: SR- Flip Flop, D- Flip Flop, JK- Flip Flop, T- Flip Flop, Edge Triggered Flip Flops, Flip Flop Input Equations, State Table, State Diagram, Problems	10

Text Books: 1. Computer System Architecture, M. Morris Mano, Pearson Publication
2. Computer System, Digital Design, Fundamentals of Computer Architecture and Assembly Language, Ata Elahi, Springer

Reference Books: 1. Digital Electronics and Micro-Computers, R.K. Gaur, Dhanpatri.
2. Introduction to Digital Electronics, John Crowe and Barrie Hayes, Gill.

Online Resources: 1. NPTEL / SWAYAM lectures.

Syllabus Semester-II

Course code: CSC41MML103

Course name: Database Management System

Course category: Major Mandatory

Credits: 2

Pre-requisites: Basic Knowledge of Data Base Management System

Course Objectives: To understand user requirements and frame it in data model

Course Outcomes: At the end of the course, the students will be able to -

CO1: Solve real world problems using appropriate set, function, and relational models

CO2: Aware SQL environment.

CO3: Design E-R Model for given requirements and convert the same into database tables

Contents –

Unit	Content	Teaching hours
1	Introduction to Database Management System: Data Definition, DBMS definition, Types of Data, Record and File, File based System Vs DBMS, Database System Application, Purpose of Database System, Three levels Architecture for a DBMS. , Component of a DBMS: Users, query processor & storage Structure. , Advantageous & Disadvantageous of DBMS. Role of DBA.	10
2	Data Modeling and Design: Data physical schema, Data Model: Importance of Data Model, Types of Data Model: Relational, ER, Semi-structured, Object-Oriented, Network & Hierarchical Data Model. , Entity-Relationship Data Model: Entity , Entity Set, Types of Entities, Strong & Weak Entity, ER diagram, mapping cardinalities, data association, Attribute, Types of Attributes , ,Relational Data Model: Basic Structure of Relational Data Model, keys, tuples, Database Schema , Constraints : Integrity Rule 1 & 2(entity integrity ,referential integrity) , Data flow diagram, Functional Dependency, Dependency Diagram, ,Normalization: First Normal Form, Second Normal Form, Third Normal Form, Conversion .	10
3	Relational Algebra & Oracle: Basic Operation - Union, Intersection, Difference and Cartesian Product, Advance Operation- Projection, Selection, Join (Inner and Outer) & Division, Examples based on above Operation, Relation Algebraic Queries. , Introduction to Oracle: Versions of Oracles, Products of Oracle, Tools of Oracle , SQL: Logging to SQL/ I SQL, SQL plus worksheet.	10

Text Books: 1.Database System Concepts, Silberschatz A., Korth H., Sudarshan S., McGraw Hill Publishers

2. Database Systems: S.K.Singh ,Pearson, 2013

Reference Books: 1. Pearson Education, Connally T, Pearson Education, 2002

Online Resources: 1. NPTEL / SWAYAM lectures.

Syllabus Semester-II

Course code: CSC41MML104 **Course name:** Microprocessor **Course category:** Major Mandatory
Credits: 2

Pre-requisites: Basic Knowledge of Digital Electronics.

Course Objectives: On completion of this course the student will be able to: Understand and classify the instruction set of 8086 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Describe the architecture & organization of 8086 Microprocessor.

CO2: Relate the addressing modes used in the instructions.

CO3: Realize the Interfacing of memory & various I/O devices with 8086 microprocessor.

Contents –

Unit	Content	Teaching hours
1	Introduction to Microprocessor an Microcomputer: Historical background Microprocessor based personal computer system, Computer data formats. 8086 Hardware specification , Microcomputer structure and operation 8086 internal architecture ,Real Mode & Protected Mode Memory Addressing, Memory Paging. Introduction to programming 8086 : Prog lang.	10
2	Addressing Modes Data addressing modes Program memory addressing modes Stack memory addressing modes Data Movement Instructions (Inst related with 8086 only) MOV revisited: Machine language, theop-code, MOD field, resister assignment, R/M memory addressing, special addr. Mode.	10
3	Data Movement Instructions: PUSH/POP, initializing stack. Miscellaneous data transfer instructions: XCHG, LAHF & SAHF, Arithmetic instructions, Addition, subtraction and comparison Multiplication and division BCD and ASCII arithmetic.	10

Text Books: 1.The Intel Microprocessors: Architecture, programming and interfacing, Barry B. Brey.

Reference Books: 1.Microprocessors and Interfacing, Douglas Hall.

Online Resources: 1. NPTEL / SWAYAM lectures.

Semester-II**Course code:** CSC41MMP103**Course name:** Practical on Data base management System**category:** Major Mandatory**Credits:** 1**Course Objectives:** The main objective is students gain knowledge about databases for storing the data and to share the data among different kinds of users for their business operations.**Course Outcomes:** At the end of the course, the students will be able to -**CO1:** Understand concept of Database Management system**CO2:** Understand application of SQL environment**Contents –**

Unit	Content	Teaching hours
1	Draw E-R diagram and convert entities and relationships to relation table for a given scenario. a. Two assignments shall be carried out i.e. consider two different scenarios (eg. bank, college)	1
2	Write relational algebra queries for a given set of relations	1
3	Perform the following: a. Viewing all databases, Creating a Database, Viewing all Tables in a Database, Creating Tables (With and Without Constraints), Inserting/Updating/Deleting Records in a Table, Saving (Commit) and Undoing (rollback)	1
4	Perform the following: a. Altering a Table, Dropping/Truncating/Renaming Tables, Backing up / Restoring a Database.	1
5	For a given set of relation schemes, create tables and perform the following Simple Queries, Simple Queries with Aggregate functions, Queries with Aggregate functions (group by and having clause), Queries involving- Date Functions, String Functions , Math Functions Join Queries- Inner Join, Outer Join Sub queries- With IN clause, With EXISTS clause	1
6	For a given set of relation tables perform the following a. Creating Views (with and without check option), Dropping views, Selecting from a view	1
7	Write a PL/SQL program using FOR loop to insert ten rows into a database table.	1
8	Given the table EMPLOYEE (Emp No, Name, Salary, Designation, Dep tID) write a cursor to select the five highest paid employees from the table.	1
9	Illustrate how you can embed PL/SQL in a high-level host language such as C And demonstrates how a banking debit transaction might be done.	1
10	Given an integer i, write a PL/SQL procedure to insert the tuple (i, 'xxx') into a given relation.	1

Text Books: 1.Database System Concepts, Silberschatz A., Korth H., Sudarshan S., McGraw Hill Publishers

Reference Books: 1. Pearson Education, Connally T, Pearson Education, 2002

Online Resources: NPTEL / SWAYAM lectures.

Semester-II

Course code: CSC41MMP104 **Course name:** Practical on Microprocessor **category:** Major Mandatory
Credits: 1

Course Objectives: On completion of this course the student will be able to: Understand and classify the instruction set of 8086 microprocessor and distinguish the use of different instructions and apply it in assembly language programming.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Understand Assembly Language programming concept.

CO2: To develop and execute assembly language program.

Contents –

Unit	Content	Teaching hours
1	Addition and subtraction of two 8-bit numbers with programs based on different Addressing modes of 8086.	1
2	Addition and subtraction of two 16-bit numbers. (Using 2's Complement method, also programs which access numbers from specified memory location)	1
3	Multiplication of two 8-bit numbers using the method of successive Addition and Shift & add.	1
4	Division of two 8-bit numbers using the method of successive subtraction and shifts & subtract.	1
5	Block transfer and block exchange of data bytes.	1
6	Design and develop an Assembly language program using 8086 microprocessor and to show the following aspects. a. Programming b. Execution c. Debugging.	1
7	Write an ALP program to perform 8 Bit arithmetic operations using MASM software and 8086.	1
8	Write an ALP program to perform 16 Bit arithmetic operations using MASM software and 8086.	1
9	Write an ALP program to perform 3*3 matrix multiplication and addition	1
10	Write an ALP program to perform ascending order using 8086	1

Text Books: 1. The Intel Microprocessors: Architecture, programming and interfacing, Barry B. Brey.

Reference Books: 1. Microprocessors and Interfacing, Douglas Hall.

Online Resources: NPTEL / SWAYAM lectures.

Semester-II

Course code: CSC41VSP102 **Course name:** Practical's on Object oriented Programming

Course category: Vocational skill course

Credits: 1

Pre-requisites: Basic knowledge of programming language.

Course Objectives: To understand object oriented programming concept.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Classify inheritance with the understanding of early and late binding, Usage of exception handling, generic programming

CO2: Demonstrate the use of various OOPs concepts with the help of programs.

Contents –

Unit	Content	Teaching hours
1	Write a C++ program to find the sum of individual digits of a positive integer	1
2	Write a C++ program to generate the first n terms of the sequence	1
3	Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.	1
4	Write a C++ program to sort a list of numbers in ascending order.	1
5	Write a program Illustrating Class Declarations, Definition, and Accessing Class Members	1
6	Program to illustrate default constructor, parameterized constructor and copy constructors	1
7	Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.	1
8	Write a Program to Demonstrate the i) Operator Overloading. ii) Function Overloading.	1
9	Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.	1
10	Write a Program to Generate Fibonacci Series use Constructor to Initialize the Data Members.	1

Text Books: 1.Object Oriented Programming with C++ ,E Balagurusamy , Tata McGraw-Hill Education

Reference Books: 1.A Tour of C++, Bjarne Stroustrup ,Addison-Wesley Professional

Online Resources: NPTEL / SWAYAM lectures.

Syllabus Semester-II

Course code: CSC41SEL102

Course name: Internet of Things

Course category: Skill Enhancement course

Credits: 2

Pre-requisites: Basic Knowledge of Internet, Digital Electronic

Course Objectives: In this course, student will explore various components of Internet of things such as Sensors, Internet working.

Course Outcomes: At the end of the course, the students will be able to -

CO1: Understand the vision of IoT from a global context.

CO2: Understand the application of IoT

CO3: Building state of the art architecture in IoT

Contents –

Unit	Content	Teaching hours
1	Introduction of Internet of Things : IoT Definition, Characteristics, IoT Functional Blocks, Physical design of IoT, Logical Design of IOT, IOT Enabling Technologies, IOT Levels & Deployment Templates Domain Specific IOT: Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, industry, Health & lifestyle.	10
2	IOT and M2M: Introduction, M2M, Difference Between IoT and M2M, SDN and NFV for IoT. IOT System Management With NETCONF-YANG: Need for IoT Systems Management, Simple Network Management Protocol (SNMP), Limitation of SNMP, Network operator requirements, NETCONF, YANG, IoT Systems Management with Net conf-yang.	10
3	IOT Platform Design: Introduction, IoT Design Methodology, case Study on IoT System for Weather Monitoring, Motivation for using Python. IOT System –Logic Design Using Python: Introduction, Installing Python, python Data types & Data Structures, Control Flow, Functions, Modules, Packages, file handling data/time operation, classes, Python Packages of interest for IoT.	10

Text Books: 1. Internet of Things (A Hands-on-Approach), Vijay Madiseti , Arshdeep Bahga, VPT

Reference Books: 1. Internet of Things (IoT) Technologies, Application, Challenges, and Solution, B.K. Tripathy & J. Anuradha, CRC Press.

2. From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence, Jan Holler, Vlasios Tsiatsis, Apress Publications

Online Resources: 1. NPTEL / SWAYAM lectures.