MAHENDRA ENGINEERING COLLEGE
(Autonomous)
Accredited by NAAC 'A' Grade & NBA Tier-I (WA) UG: CSE,ECE,EEE
Mahendhirapuri, Mallasamudram, Namakkal Dt. - 637 503.

B.TECH. INFORMATION TECHNOLOGY

CURRICULUM FOR
CHOICE BASED CREDIT SYSTEM
(Regulations-2022)

DEPARTMENT OF INFORMATION TECHNOLOGY
MAHENDRA ENGINEERING COLLEGE
(AUTONOMOUS)

MAHENDHIRAPURI, MALLASAMUDRAM,
NAMAKKAL Dt. TAMIL NADU- 637503

MAHENDRA ENGINEERING COLLEGE, (AUTONOMOUS)
MALLASAMUDRAM WEST, TAMIL NADU 637503
DEPARTMENT OF INFORMATION TECHNOLOGY

Institute Vision

To be an internationally recognized institute for engineering education and research with ethical values

Institute Mission

- To ensure the effective use of resources to mould the students as professionals and entrepreneurs
- To enhance industry institute interaction for innovative technology practice
- To encourage the faculty members and students for advanced research
- To inculcate ethical values among the faculty members and students

Department Vision

- To produce capable IT graduates conversant with latest technologies to contribute to national and international needs.

Department Mission

- To impart technological education through effective teaching- learning process.
- To facilitate students excel in academic, technical and social activities to meet the industrial needs
- To develop the students to be innovative, competent, efficient, disciplined and quality IT technocrats.
- To encourage research activities with analytical skills to face global challenges.

Program Educational Objectives

The graduates of this program after three years will:

PEO1: Apply modern computational, analytical tools and techniques in IT and allied engineering streams.

PEO2: Develop innovative technology systems that are technically sound, economically feasible and socially acceptable to enhance quality of life.

PEO3: Communicate effectively and enhance leadership skills.

PEO4: Exhibit ethical attitude and pursue lifelong learning to achieve career goals.

Programme Specific Outcomes (PSOs)

The students will demonstrate the ability to

PSO1: Apply the fundamental knowledge to develop IT based solution in the areas related to information management and networking.

PSO2: Maximize the knowledge and skills in the emerging areas of IT to meet the requirements of the society and the industry.

	Regulations 2022 Curriculum for I –VIII Semesters						
	I Semester						
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22MA12101	Engineering Mathematics- I	3	1	0	4	BS
2	22PY12101	Engineering Physics	3	0	0	3	BS
3	22CS13001	Problem Solving Techniques using C	3	0	0	3	PC
4	22EE13101	Basics of Electrical and Electronics Engineering (Integrated Course)	2	0	2	3	ES
5	22CS13101	Digital Logic and Microprocessors	3	0	0	3	ES
6		Induction program	-	-	-	-	MC
7	22HS11001	Heritage of Tamils	1	0	0	1	HS
	PRACTICAL						
8	22PY12001	Physics Laboratory	0	0	3	1.5	BS
9	22CS23001	Problem Solving Techniques in C Laboratory	0	0	3	1.5	PC
		TOTAL	**15**	**01**	**08**	**20**	
	II Semester						
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22EN11001	Communicative English	3	0	0	3	HS
2	22MA12201	Engineering Mathematics –II	3	1	0	4	BS
3	22CY12001	Chemistry for Engineering	3	0	0	3	BS
4	22GE13001	Engineering Graphics and Design	3	0	2	4	ES
5	22IT14201	Information Technology Essentials	3	0	0	3	PC
6	22HS 11002	Tamils and Technology	1	0	0	1	HS
	PRACTICAL						
7	22CY22001	Chemistry Laboratory	0	0	3	1.5	BS
8	22IT24201	Information Technology Essentials Laboratory	0	0	3	1.5	PC
9	22EN21001	Personality Development Practice Laboratory	0	0	2	1	HS
		TOTAL	**16**	**01**	**10**	**22**	

III Semester							
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22MA12301	Probability And Discrete Mathematics	3	1	0	4	BS
2	22IT14301	Computer Architecture and Organization	3	0	0	3	PC
3	22IT14302	Data Structures and Algorithms	3	1	0	4	PC
4	22IT14303	Python Programming	3	0	0	3	PC
5		Open Elective- 1	3	0	0	3	OE
6	22CY11001	Environmental Science And Engineering	3	0	0	-	MC
	PRACTICAL						
7	22IT24301	Data Structures and Algorithms Laboratory	0	0	3	1.5	PC
8	22IT24302	Python Programming Laboratory	0	0	3	1.5	PC
		TOTAL	**18**	**02**	**06**	**20**	

IV Semester							
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22IT14401	Computer Networks	3	0	0	3	PC
2	22IT14402	Database Technology	3	0	0	3	PC
3		Java Programming	3	0	0	3	PC
4		Program Elective-1	3	0	0	3	PE
5		Open Elective-2	3	0	0	3	OE
6	22SH11006	Universal Human Values	2	1	0	3	MC
	PRACTICAL						
7	22IT24401	Operating Systems (Integrated Course)	2	0	2	3	PC
8	22IT24402	Database Technology Laboratory	0	0	3	1.5	PC
9	22EN60001	Professional Communication Skills	0	1	2	2	HS
		TOTAL	**19**	**02**	**07**	**24.5**	

	V Semester						
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22IT14501	Computer Graphics and Multimedia	3	0	0	3	PC
2	22IT14502	Web Technology	3	0	0	3	PC
3	22IT34503	Object Oriented Software Engineering(Integrated Course)	2	0	2	3	PC
4		Program Elective-2	3	0	0	3	PE
5		Open Elective-3	3	0	0	3	OE
6		Open Elective-4	3	0	0	3	OE
7	22IT14503	Constitution of India	3	0	0	-	MC
	PRACTICAL						
8	22IT24501	Multimedia Laboratory	0	0	3	1.5	PC
9	22IT24502	Web Technology Laboratory	0	0	3	1.5	PC
10	22EN60002	Interview Skills and Soft Skills	0	1	2	2	EEC
		TOTAL	**20**	**01**	**10**	**23**	

	VI Semester						
Sl. No	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1		Managerial Skills,Project and Quality Management	3	0	0	3	HS
2	22IT14601	Artificial Intelligence with Machine Learning	3	0	0	3	PC
3	22IT14602	Cloud Computing	3	0	0	3	PC
4	22IT14603	Blockchain Technology	3	0	0	3	PC
5		Program Elective–3	3	0	0	3	PE
6		Open Elective –5	3	0	0	3	OE
	PRACTICAL						
7	22IT24601	Machine Learning Laboratory	0	0	3	1.5	PC
8	22IT24602	Cloud Computing Laboratory	0	0	3	1.5	PC
9	22IT36601	Mini Project	0	0	6	3	EEC
		TOTAL	**18**	**0**	**12**	**24**	

VII Semester							
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22IT14701	Big Data Analytics	3	0	0	3	PC
2	22IT14702	Cyber Security	3	0	0	3	PC
3	22IT14703	Mobile Application Development	3	0	0	3	PC
4		Program Elective -4	3	0	0	3	PE
5		Open Elective –6	3	0	0	3	PC
	PRACTICAL						
6	22IT24701	Big Data Analytics Laboratory	0	0	3	1.5	PC
7	22IT24702	Mobile Application Development Laboratory	0	0	3	1.5	PC
8	22IT26701	Internship in Industry	0	0	2	1.5	EEC
		TOTAL	**15**	**0**	**08**	**19.5**	

VIII Semester							
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1		Program Elective -5	3	0	0	3	PE
2		Program Elective -6	3	0	0	3	PE
	PRACTICAL						
3	22IT36801	Project Work	0	0	12	6	EEC
		TOTAL	**6**	**0**	**12**	**12**	

TOTAL NUMBER OF CREDITS: 20+22+20+24.5+23+24+19.5+12 = 165

HUMANITIES AND SOCIAL SCIENCES INCLUDING MANAGEMENT (HS)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
1	22EN11001	Communicative English	3	0	0	3	HS
2	22HS11001	Heritage of Tamils	1	0	0	1	HS
3	22HS 11002	Tamils and Technology	1	0	0	1	HS
4	22EN21001	Personality Development Practice Laboratory	0	0	2	1	HS
5	22EN60001	Professional Communication Skills	0	1	2	2	HS
6		Managerial Skills and Quality Management	3	0	0	3	HS

BASIC SCIENCES (BS)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
1	22MA12101	Engineering Mathematics- I	3	1	0	4	BS
2	22PY12101	Engineering Physics	3	0	0	3	BS
3	22PY12001	Physics Laboratory	0	0	3	1.5	BS
4	22MA12201	Engineering Mathematics –II	3	1	0	4	BS
5	22CY12001	Chemistry for Engineering	3	0	0	3	BS
6	22CY22001	Chemistry Laboratory	0	0	3	1.5	BS
7	22MA12301	Probability and Discrete Mathematics	3	1	0	4	BS

ENGINEERING SCIENCES (ES)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
1	22EE13101	Basics of Electrical and Electronics Engineering(Integrated Course)	3	0	0	3	ES
2	22CS13101	Digital Logic and Microprocessors	3	0	0	3	ES
3	22GE13001	Engineering Graphics and Design	2	0	2	3	ES

PROFESSIONAL CORE (PC)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
1	22CS13001	Problem Solving Techniques using C	3	0	0	3	PC
2	22CS23001	Problem Solving Techniques in C Laboratory	0	0	3	1.5	PC
3	22IT14201	Information Technology Essentials	3	0	0	3	PC
4	22IT24201	Information Technology Essentials Laboratory	0	0	3	1.5	PC
5	22IT13301	Computer Architecture and Organization	3	0	0	3	PC
6	22IT14302	Data Structures and Algorithms	3	1	0	4	PC
7	22IT14303	Python Programming	3	0	0	3	PC
8	22IT24401	Operating Systems (Integrated Course)	2	0	2	3	PC
9	22IT24301	Data Structures and Algorithms Laboratory	0	0	3	1.5	PC
10	22IT24302	Python Programming Laboratory	0	0	3	1.5	PC
11	22IT14401	Computer Networks	3	0	0	3	PC
12	22IT14402	Database Technology	3	0	0	3	PC
13		Java Programming	3	0	0	3	PC
14	22IT24402	Database Technology Laboratory	0	0	3	1.5	PC
15	22IT14501	Computer Graphics and Multimedia	3	0	0	3	PC
16	22IT14502	Web Technology	3	0	0	3	PC
17	22IT34503	Object Oriented Software Engineering(Integrated Course)	2	0	2	3	PC
18	22IT24501	Multimedia Laboratory	0	0	3	1.5	PC
19	22IT24502	Web Technology Laboratory	0	0	3	1.5	PC
20	22IT14601	Artificial Intelligence with Machine Learning	3	0	0	3	PC
21	22IT14602	Cloud Computing	3	0	0	3	PC
22	22IT14603	Blockchain Technology	3	0	0	3	PC
23	22IT24601	Artificial Intelligence Laboratory	0	0	3	1.5	PC
24	22IT24602	Cloud Computing Laboratory	0	0	3	1.5	PC
25	22IT14701	Big Data Analytics	3	0	0	3	PC
26	22IT14702	Cyber Security	3	0	0	3	PC
27	22IT14703	Mobile Application Development	3	0	0	3	PC
28	22IT24701	Big Data Analytics Laboratory	0	0	3	1.5	PC
29	22IT24702	Mobile Application Development Laboratory	0	0	3	1.5	PC

PROGRAM ELECTIVE COURSES: VERTICALS

Vertical I Cloud Computing And Data Center Technologies	Vertical II Application Development	Vertical III Artificial Intelligence	Vertical IV Network And Data Security	Vertical V Creative Media
Information Storage and Management	Open Source Software	Data Warehousing and Data Mining	Embedded Systems and IoT	Augmented Reality/Virtual Reality
Optimization Techniques	Agile Methodologies	Computer Vision	Social Network Analysis	Multimedia and Animation
Multi-Core Computing	DevOps	Natural Language Processing	5G Networks	Video Creation and Editing
Distributed Computing	Software Testing	Bio-Informatics	Satellite Communication	Digital marketing
Green Computing	C# and .Net Programming	Human Computer Interaction	Cyber Physical Systems	Game Development
Virtualization Techniques	Advanced Java Programming	Robotics and Automation	Cyber Forensics	Multimedia Data Compression and Storage
Web Development Frameworks	Software Project Management	Tesxt to Speech Analysis	Information Security	Digital Image Processing
Information Retrieval Techniques	Modeling and Simulation	Soft Computing	Ethical Hacking	E-Learning Techniques
		Game Theory	Security & Privacy in cloud	
		Knowledge Engineering		

PROGRAM ELECTIVES (PE)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES							
1	22IT15001	Information Storage and Management	3	0	0	3	PE
2	22IT15002	Optimization Techniques	3	0	0	3	PE
3	22IT15003	Multi-Core Computing	3	0	0	3	PE
4	22IT15004	Distributed Computing	3	0	0	3	PE
5	22IT15005	Green Computing	3	0	0	3	PE
6	22IT15006	Virtualization Techniques	3	0	0	3	PE
7	22IT15007	Web Development Frameworks	3	0	0	3	PE
8	22IT15008	Information Retrieval Techniques	3	0	0	3	PE
APPLICATION DEVELOPMENT							
9	22IT15009	Open Source Software	3	0	0	3	PE
10	22IT15010	Agile Methodologies	3	0	0	3	PE
11	22IT15011	DevOps	3	0	0	3	PE
12	22IT15012	Software Testing	3	0	0	3	PE
13	22IT15013	C# and .Net Programming	3	0	0	3	PE
14	22IT15014	Advanced Java Programming	3	0	0	3	PE
15	22IT15015	Software Project Management	3	0	0	3	PE
16	22IT15016	Modeling and Simulation	3	0	0	3	PE
ARTIFICIAL INTELLIGENCE							
17	22IT15017	Data Warehousing and Data Mining	3	0	0	3	PE
18	22IT15018	Computer Vision	3	0	0	3	PE
19	22IT15019	Natural Language Processing	3	0	0	3	PE
20	22IT15020	Bio-Informatics	3	0	0	3	PE
21	22IT15021	Human Computer Interaction	3	0	0	3	PE

22	22IT15022	Robotics and Automation	3	0	0	3	PE
23	22IT15023	Tesxt to Speech Analysis	3	0	0	3	PE
24	22IT15024	Soft Computing	3	0	0	3	PE
25	22IT15025	Game Theory	3	0	0	3	PE
26	22IT15026	Knowledge Engineering	3	0	0	3	PE
NETWORK AND DATA SECURITY							
27	22IT15027	Embedded Systems and IoT	3	0	0	3	PE
28	22IT15028	Social Network Analysis	3	0	0	3	PE
29	22IT15029	5G Networks	3	0	0	3	PE
30	22IT15030	Satellite Communication	3	0	0	3	PE
31	22IT15031	Cyber Physical Systems	3	0	0	3	PE
32	22IT15032	Cyber Forensics	3	0	0	3	PE
33	22IT15033	Information Security	3	0	0	3	PE
34	22IT15034	Ethical Hacking	3	0	0	3	PE
35	22IT15035	Security & Privacy in cloud	3	0	0	3	PE
CREATIVE MEDIA							
36	22IT15036	Augmented Reality/Virtual Reality	3	0	0	3	PE
37	22IT15037	Multimedia and Animation	3	0	0	3	PE
38	22IT15038	Video Creation and Editing	3	0	0	3	PE
39	22IT15039	Digital marketing	3	0	0	3	PE
40	22IT15040	Game Development	3	0	0	3	PE
41	22IT15041	Multimedia Data Compression and Storage	3	0	0	3	PE
42	22IT15042	Digital Image Processing	3	0	0	3	PE
43	22IT15043	E-Learning Techniques	3	0	0	3	PE

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
1	22EN60002	Interview Skills and Soft Skills	0	1	2	2	EEC
2	22IT36601	Mini Project	0	0	6	3	EEC
3	22IT26701	Internship in Industry	0	0	2	1.5	EEC
4	22IT36801	Project Work	0	0	12	6	EEC

MANDATORY COURCE (MC)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
1		Induction program	-	-	-	-	MC
2	22CY11001	Environmental Science And Engineering	3	0	0	-	MC
3	22SH11006	Universal Human Values	2	1	0	3	MC
4	22IT14503	Constitution of India	3	0	0	-	MC

OPEN ELECTIVES (OE)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
1	22IT10001	Network Essentials	3	0	0	3	OE
2	22IT10002	Database Management Systems	3	0	0	3	OE
3	22IT10003	Object Oriented Programming	3	0	0	3	OE
4	22IT10004	Python Programming	3	0	0	3	OE
5	22IT10005	Operating Systems	3	0	0	3	OE
6	22IT10006	Data Structures	3	0	0	3	OE
7	22IT10007	Introduction to Artificial Intelligence	3	0	0	3	OE
8	22IT10008	Mobile Application Development	3	0	0	3	OE
9	22IT10009	Introduction to Data Science	3	0	0	3	OE
10	22IT10010	Internet of Things	3	0	0	3	OE
11	22IT10011	Digital Marketing	3	0	0	3	OE
12	22IT10012	Blockchain Technology	3	0	0	3	OE
13	22IT10013	Cryptography & Network Security	3	0	0	3	OE
14	22IT10014	E-Learning Techniques	3	0	0	3	OE
15	22IT10015	Data Mining	3	0	0	3	OE

VALUE ADDED COURSES(VAC)

S.NO	COURSE CODE	COURSE TITLE
1	23IT01	Full Stack Development
2	23IT02	Enterprise Application Development
3	23IT03	Android APP Development
4	23IT04	Web based APP Development
5	23IT05	Social Media Analysis
6	23IT06	Machine Learning with TensorFlow
7	23IT07	Ruby on Rails
8	23IT08	PHP Training
9	23IT09	R Programming

SUMMARY

Sl. No	Subject Area	Credits as Per Semester								Credits Total	Credits %
		I	II	III	IV	V	VI	VII	VIII		
1	HS	1	5	-	2	-	3	-	-	**11**	**6.66**
2	BS	8.5	8.5	4	-	-	-	-	-	**21**	**12.72**
3	ES	6	4	-	-	-	-	-	-	**10**	**6.06**
4	PC	4.5	4.5	13	13.5	12	12	12	-	**71.5**	**43.33**
5	PE	-	-	-	3	3	3	3	6	**18**	**10.90**
6	OE	-	-	3	3	6	3	3	-	**18**	**10.90**
7	EEC	-	-	-	-	2	3	1.5	6	**12.5**	**7.57**
8	MC	-	-	*	3	*	-	-	-	**03**	**1.81**
	Total	**20**	**22**	**20**	**24.5**	**23**	**24**	**19.5**	**12**	**165**	

***-Non Credit Mandatory Course (MC)**

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

FS 68172

	Regulations 2022						
	I Semester						
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22MA12101	Engineering Mathematics- I	3	1	0	4	BS
2	22PY12101	Engineering Physics	3	0	0	3	BS
3	22CS13001	Problem Solving Techniques using C	3	0	0	3	PC
4	22EE13101	Basics of Electrical and Electronics Engineering (Integrated Course)	2	0	2	3	ES
5	22CS13101	Digital Logic and Microprocessors	3	0	0	3	ES
6		Induction program	-	-	-	-	MC
7	22HS11001	Heritage of Tamils	1	0	0	1	HS
	PRACTICAL						
8	22PY12001	Physics Laboratory	0	0	3	1.5	BS
9	22CS23001	Problem Solving Techniques in C Laboratory	0	0	3	1.5	PC
		TOTAL	**15**	**01**	**08**	**20**	

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**MATHEMATICS**	**ProgrammeCode**	

SEMESTER – I

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22MA12101	**ENGINEERING MATHEMATICS- I (Common to all Branches)**	3	1	0	4	**100**

Objectives	To enable the students to: • Learn the types of matrices and linear algebra in a comprehensive manner. • Familiarize with functions of several variables, which is applied in electrical and communication branch engineering. • Define the geometric aspects of curvature, radius of curvature, evolutes and envelopes as application of differential calculus. • Explain different types of higher order ordinary differential equations with variable coefficients and various methods to solve the equations. • Learn the double and triple integrals and give their representation as area and volume.
Outcomes	At the end of the course the students will be able to: • Solve the system of equations and determine rank, eigen values, eigen vectors and inverse of a given matrix and diagonalize symmetric matrix by orthogonal transformations. • Illustrate maxima and minima functions of several variables. • Apply the concepts of differential calculus in physical problems. • Solve the higher order differential equations with variable coefficients. • Compute the area and volume by using multiple integrals.

UNIT – I	**MATRICES**	**9+3**

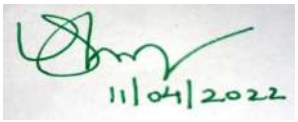
Matrix and its types – Rank of matrix - Characteristic equation - Eigen values and Eigen vectors of the matrix - Cayley-Hamilton Theorem, Diagonalization of real and symmetric matrices by Orthogonal transformation – Reduce the quadratic form to canonical form.

UNIT – II	**DIFFERENTIAL CALCULUS OF SEVERAL VARIABLES**	**9+3**

Differentiation of implicit functions – Partial derivatives – Total derivative – Euler's theorem –Jacobian and properties – Taylor's series for functions of two variables – Maxima and minima of functions of two variables – Lagrange's method of undetermined multipliers.

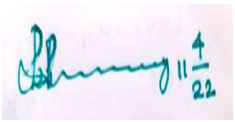
UNIT – III	**APPLICATIONS OF DIFFERENTIAL CALCULUS**	**9+3**
Curvature in Cartesian co-ordinates– Centre and radius of curvature – Circle of curvature – Evolutes – Envelopes – Evolute as envelope of normals and their properties.		
UNIT – IV	**ORDINARY DIFFERENTIAL EQUATIONS OF HIGHER ORDERS**	**9+3**
Second and Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy Euler equation, Legendre's type differential equations – System of simultaneous linear differential equations with constant coefficients.		
UNIT – V	**MULTIPLE INTEGRALS**	**9+3**
Double integrals in Cartesian co-ordinates – Change of order of integration – Area as double integral – Triple integral in Cartesian co-ordinates – Volume as triple integral – Change of variables in double integrals.		
Total		**(L:45+T:15): 60**

TEXT BOOKS :	
1	T. Veerarajan, Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2019.
2	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
3	G.Balaji, Engineering Mathematics – I, G.Balaji Publication, 3rd Edition, 2015.
REFERENCES:	
1	Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2016.
2	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint,2002.
3	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint, 2016.
4.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 9th Edition, 2014.



Member

Prof. K.SHANMUGAM



Subject Expert

Dr. K. KANNAN

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO2	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO4	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO5	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
Average	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)-Syllabus						R 2022
DEPARTMENT:	SCIENCE & HUMANITIES		Programme Code & Name			ENGINEERING PHYSICS
SEMESTER-I&II						
COURSE CODE	**COURSE NAME**	**HOURS/WEEK**			**CREDIT**	**MAXIMUM MARKS**
		L	**T**	**P**	**C**	
22PY12101	**ENGINEERING PHYSICS (FOR ALL BRANCHES)**	3	0	0	3	**100**
Objective(s)	➢ To provide students with a fundamental knowledge of physics, together with problem-solving skills ➢ Understanding of Basics of Physics about lasers, Acoustics, Properties of matter, Semiconductor Physics and Quantum Physics. How these are used in information and communication technology.					
Outcome(s)	After completing the course the students ➢ Explain the basics of Laser, Fiber Optics and its types with its applications in various fields. ➢ Gain knowledge about Acoustics and Ultrasonic's their applications in various engineering fields. ➢ Have the necessary understanding on Properties of materials and their uses. ➢ Get Knowledge on basics concepts of Quantum Physics with their Applications. ➢ Acquire knowledge on basics of semiconducting materials and their applications in Solar.					
UNIT I	**LASER AND FIBER OPTICS**					9 (Hrs)
Introduction – Principle of spontaneous emission, stimulated absorption and emission – Einstein's coefficient (derivation) – Types of lasers - CO_2, Nd: YAG – Fiber optics: principle, numerical aperture and acceptance angle - types of optical fibers (material, refractive index and mode) – losses associated with optical fibers - fiber optic sensors: pressure and displacement.						
UNIT II	**ULTRASONICS AND ACOUSTICS**					(9 Hrs)
Introduction – Production – magnetostriction effect - magnetostriction generator – piezoelectric and inverse piezoelectric effect- piezoelectric generator – properties – Cavitations - Velocity measurement – acoustic grating – SONAR - Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C –scan displays. Classification of sound- decibel- Weber–Fechner law – Sabine's formula- derivation using growth and decay method – Absorption Coefficient and its determination –factors affecting acoustics of buildings and their remedies.						
UNIT-III	**PROPERTIES OF MATTER**					(9 Hrs)
Elasticity – Stress-strain diagram and its uses - factors affecting elastic modulus and tensile strength – torsional stress and deformations – twisting couple - torsion pendulum: theory and experiment - bending of beams - bending moment – cantilever: theory and experiment – uniform and non-uniform bending: theory and experiment - I-shaped girders - stress due to bending in beams.						

UNIT-IV	QUANTUM PHYSICS	(9 Hrs)
Black body radiation – Planck's theory (derivation) –wave particle duality – electron diffraction – concept of wave function and its physical significance – Schrödinger's wave equation – time independent and time dependent equations – particle in a one-dimensional rigid box– scanning tunneling microscope- electron tunneling microscope.		

UNIT-V	SEMICONDUCTOR PHYSICS	(9 Hrs)
Intrinsic Semiconductors – Energy band diagram – direct and indirect semiconductors – Carrier Concentration in intrinsic semiconductors – extrinsic semiconductors - Carrier concentration in N-type & P-type semiconductors. Photo current in a P- N diode – solar cell –photo detectors - LED – Organic LED – Laser diodes.-Photovoltaic applications: domestic lighting, street lighting, water pumping etc -solar PV power plant.		
Total hours to be taught		(45 Hrs)

Text books :	
1.	Dr. Palanisamy P.K, "Engineering Physics", Scitech Publications, Chennai, 2010.
2.	Dr.G.Senthil kumar - Engineering Physics-VRB Publication & Co, Chennai- Latest edition 2019.
3.	Wahab, M.A. ―Solid State Physics: Structure and Properties of Materials. Narosa Publishing House, 2009
REFERENCES	
1.	Pillai S O, "Engineering Physics", New Age International Publishers, New Delhi, 2005.
2.	Satyaprakash-Engineering Physics-Pragati Prakashan,Meerut-I Edition 2003
3.	Dr.M.Arumugam-Engineering Physics - Anuradha Agencies, Kumbakonam-III Revised Edition 2002.
4.	D. Halliday, R. Resnick and J. Walker, Fundamentals of Physics, 6th Edition, John Wiley and Sons, 2001.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO2	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO3	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO4	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
CO5	2	2	2	2	-	-	-	-	-	2	-	-	-	-	-
Average	**2**	**2**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Computer Science and Engineering**	**Programme Code**	**1031**			
I Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22CS13001	**PROBLEM SOLVING TECHNIQUES IN C (Common to All Branches)**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • To understand the basics of algorithmic problem solving • Understand the basic concepts of C Programming. • Learn the arrays and functions in C • Be familiar with pointers and structures in C • Understand the file handling techniques and preprocessors in C					
Outcome(s)	**The students will be able to:** • Develop Algorithms for real time problems through various Problem solving techniques • Define the syntax of C Programming • Summarize the use of functions and pointers in programming in C programming concepts • Apply the concepts of pointers and structure • Describe the fundamental concepts of files and preprocessors in C					
UNIT-I	**PROBLEM SOLVING ASPECTS**					**9**
Problem Solving Aspects: Algorithms Pseudo code, Flowchart- Steps In Problem Solving-simple strategies for developing algorithms (iteration, recursion)- Programming methodologies - Illustrative problems: Exchanging The Values-Counting-Find minimum in a list - Factorial Computation - Fibonacci Sequence.						
UNIT-II	**C PROGRAMMING BASICS**					**9**
Introduction to C programming – Header files – Structure of a C program – compilation and linking processes – Constants, Variables – Data Types – Expressions – operators – Input and Output operations – Decision Making and Branching – Looping statements- Programming Examples						
UNIT-III	**ARRAYS AND FUNCTIONS**					**9**
Arrays: Introduction –One-Dimensional Arrays-Two-Dimensional Arrays -Multidimensional Arrays - Strings: Operations of Strings. Function – definition of function – Declaration of function – Function prototype – Types of functions – Pass by value – Pass by reference – Recursion - Programming Examples						
UNIT-IV	**POINTERS AND STRUCTURES**					**9**

Pointers - Definition – Initialization - Pointers and arrays- Introduction to Structure – structure definition – Structure declaration – Structure within a structure- Unions – Storage classes		
UNIT-V	**FILE PROCESSING AND PREPROCESSORS**	**9**
Files: File modes- File functions-File operations-Text and Binary files, Command Line arguments- C Preprocessor directives: Macros – Definition- types of Macros- Creating and implementing user defined header files.		
Total hours to be taught		**(L:45): 45**

TEXT BOOK :	
1	Anita Goel and Ajay Mittal, "Computer Fundamentals and Programming in C", Dorling Kindersley (India)Pvt. Ltd. Pearson Education, 2016.
REFERENCES:	
1	Dromey R.G, "How to Solve it by Computer" Prentice Hall of India, Delhi., 2010.
2	E Balagurusamy, "Computer Programming", First Edition, Tata McGraw Hill Education (India) Private Ltd, New Delhi., 2013.
3	Pradip Dey, Manas Ghosh, " Computer Fundamentals and Programming in C", 2nd Edition, Oxford University Press.,2013.
4	M.Rajaram and P.Uma Maheshwari " Computer Programming with C", Pearson Education., 2013.
5	NPTEL course, Problem Solving Through Programming in C, https://nptel.ac.in/courses/106105171
6	NPTEL course, Introduction to Programming in C, https://nptel.ac.in/courses/106104128

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	2	2	-	-	2	-	-
CO2	2	3	3	-	-	-	-	-	2	2	2	2	3	2	-
CO3	2	3	3	-	-	-	-	-	2	2	2	2	3	2	-
CO4	3	-	-	-	-	-	-	-	2	2	2	2	3	2	-
CO5	2	2	3	-	-	-	-	-	2	2	2	2	3	2	-
Average	**2.2**	**2.667**	**3**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**2**	**2.8**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus-R2022						
Department	**Electrical and Electronics Engineering**			**Programme Code**		**1051**
I Semester						
Course Code	**Course name**	**Hours/Week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22EE13101	**BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING (Integrated Course)**	**2**	**0**	**2**	**3**	**100**
Objective	• To elaborate the concept of DC circuits and wiring connection. • To understand the basic concepts of Semiconductor Devices • To Demonstrate simple electrical and electronic components					
Outcomes	1. Illustrate the concept of DC circuits to compute voltage, current & resistance. 2. Explain the working principle of semiconductor devices and SMPS 3. Demonstrate the simple electrical wirings and soldering practices 4. Design simple power supply using diodes 5. Demonstrate the functions of basic electronic components					
UNIT I	**BASIC CIRCUITS AND DOMESTIC WIRING**					**(8)**
Electrical circuit elements (R, L and C)-Dependent and independent sources – Ohm's Law- Kirchhoff's laws - mesh current and node voltage methods (Analysis with only independent source) - Phasors – RMS-Average values-sinusoidal steady state response of simple RLC circuits. Types of wiring- Domestic wiring - Specification of Wires-Earthing-Methods-Protective devices.						
UNIT II	**SEMICONDUCTOR DEVICES**					**(7)**
Basic Electronic Components: Resistance - Inductor - Capacitor -Types, Functions, Symbols - Color coding of Resistance – Review of insulator, conductor and semiconductor -Semiconductor types – Drift and Diffusion Currents - Study of CRO- Construction of PN junction diode- VI characteristics of PN junction diode- Zener diode as voltage regulator – Biasing LED- Switch mode Power Supply						
S.No	**LIST OF EXPERIMENTS**					**Hours**
1	Stair case wiring					**(30)**
2	Fluorescent lamp wiring					
3	Residential house wiring using switches, fuse, indicator and lamp					
4	Fan Regulator wiring					
5	Measurement of DC and AC voltage, current and power(using Energy meter) in electrical circuits					
6	Study of CRO- Lissajous pattern					
7	VI characteristics of PN junction Diode					
8	Zener diode as voltage regulator					

9	Biasing LED	
10	Soldering practice using discrete components	
	Total Hours to be taught	**45**
Text Books:		
1	Charles K. Alexander and Mathew N.O. Sadiku, Fundamentals of Electric Circuits, 5th edition, McGraw-Hill,2019.	
2	Joseph Edministor and Nahvi (Mohmood), 'Theory & Problems of Electric Circuits', 5th edition, McGraw Hill, 2020.	
3	V.K Mehta and Rohit Mehta, 'Principle of Electrical Engineering' S Chand & Company, 2008.	
References		
1	Robert T. Paynter, "Introducing Electronics Devices and Circuits", Pearson Education, 7th Edition, 2006.	
2	J. Millman & Halkins, Satyebranta Jit, "Electronic Devices & Circuits", Tata McGraw Hill, 2nd Edition, 2008.	

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	3	3	2	-	-	-	-	1	-	3	-	-	-
CO2	3	-	3	3	2	-	-	-	-	1	-	2	-	-	-
CO3	2	3	2	3	-	-	-	-	-	2	-	2	-	-	-
CO4	3	2	2	3	1	-	-	-	-	1	-	3	-	-	-
CO5	3	2	3	3	-	-	-	-	-	1	-	3	-	-	-
Average	**2.6**	**1.8**	**2.6**	**3**	**1**	**-**	**-**	**-**	**-**	**1.2**	**-**	**2.6**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRAENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Computer Science and Engineering**	**Programme Code**	**1031**

I Semester

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22CS13101	**DIGITAL LOGIC & MICROPROCESSORS**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • To know about various number systems and logic gates • To understand the basic concepts of boolean functions and their simplifications • To learn the basics of combinational circuits and their various components • To be familiar the basics of sequential circuits and their various components • To understand the architecture of 8086 microprocessor
Outcome(s)	**The students will be able to:** • Explain the conversion of number systems from one form to another and logic gates • Describe boolean functions and their simplification techniques • Summarize the components comes under combinational circuits and their the use of functions and pointers in programming in C programming concepts • Interpret different types of sequential circuits • Describe the architecture of 8086 microprocessor

UNIT-I	**DIGITAL FUNDAMENTALS**	**9**
Review of Number Systems – Number conversion - Arithmetic Operations – Binary Codes – Logic Gates – NAND and NOR Implementations		
UNIT-II	**BOOLEAN FUNCTIONS**	**9**
Boolean Algebra and Theorems – Boolean Functions – Simplification of Boolean Functions - Karnaugh Map - Tabulation Method		
UNIT-III	**COMBINATIONAL CIRCUITS**	**9**
Introduction to Combinational Circuits – Half adder – Full adder – Half Subtractor – Full Subtractor – Decoder – Encoder – Multiplexer - Demultiplexer		
UNIT-IV	**SEQUENTIAL CIRCUITS**	**9**
Introduction to Sequential Circuits - Flip Flops – Types of Flip flops – Shift registers – Counters: 4-bit binary synchronous and asynchronous counters		
UNIT-V	**8086 MICROPROCESSOR ARCHITECTURE**	**9**
Introduction to Microprocessor – 8086 Pin diagram - CPU architecture – Addressing modes – Instruction formats – Data transfer instructions – Arithmetic instructions – Logical instructions – Branch and loop instructions - Interrupts		
Total hours to be taught	**(L:45): 45**	

TEXT BOOK :	
1	M. Morris Mano, Michael D Ciletti, “Digital Design”, Global Edition, Pearson Education Ltd, 2019.
2	Barry B.Brey, “The Intel Microprocessors – Architecture, Programming, and Interfacing”, Pearson Prentic Hall, 2009.
REFERENCES:	
1	John F.Wakerly, “Digital Design Principles and Practices”, Fourth Edition, Pearson Education, 2007.
2	Kharate G. K., “Digital Electronics”, Oxford University Press, 2010.
3	Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011
4	Nptel course, Digital Logic Design, https://onlinecourses.nptel.ac.in/noc22_ee45/preview

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	-	-	1	-	3	-	-	-
CO2	3	--	-	-	-	-	-	-	-	1	-	2	-	-	-
CO3	2	3	-	-	-	-	-	-	-	2	-	2	-	-	-
CO4	3	2	-	-	-	-	-	-	-	1	-	3	-	-	-
CO5	3	2	-	-	-	-	-	-	-	1	-	3	-	-	-
Average	**2.8**	**1.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.2**	**-**	**2.6**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

FS 68172

Regulations 2022

Batch 2022-2023 - II Semester
Batch 2023-2024 onwards - I Semester
(Common to all B.E./B.Tech. Programmes)

Course Code	Course Name	Periods/Week			Credit	Maximum Marks
		L	T	P	C	
22HS11001	தமிழர் மரபு	1	0	0	1	100

BoS Chairman

அலகு 1	மொழி மற்றும் இலக்கியம்	3

இந்திய மொழிக் குடும்பங்கள் – திராவிட மொழிகள் – தமிழ் ஒரு செம்மொழி – தமிழ் செவ்வியக்கங்கள் – சங்க இலக்கியத்தின் சமயச் சார்பற்ற தன்மை – சங்க இலக்கியத்தில் பகிர்தல் அறம் – திருக்குறளில் மேலாண்மைக் கருத்துக்கள் – தமிழ்க் காப்பியங்கள், தமிழகத்தில் சமண பௌத்த சமயங்களின் தாக்கம் – பக்தி இலக்கியம், ஆழ்வார்கள் மற்றும் நாயன்மார்கள் – சிற்றிலங்கியங்கள் – தமிழில் நவீன இலக்கியத்தின் வளர்ச்சி – தமிழ் இலக்கிய வளர்ச்சியில் பாரதியார் மற்றும் பாரதிதாசன் ஆகியோரின் பங்களிப்பு.

அலகு 2	மரபு – பாறை ஓவியங்கள் முதல் நவீன ஓவியங்கள் வரை – சிற்பக் கலை	3

நடுகல் முதல் நவீன சிற்பங்கள் வரை – ஐம்பொன் சிலைகள் – பழங்குடியினர் மற்றும் அவர்கள் தயாரிக்கும் கைவினைப் பொருட்கள், பொம்மைகள் – தேர் செய்யும் கலை – சுடுமண் சிற்பங்கள் – நாட்டுப்புறத் தெய்வங்கள் – குமரிமுனையில் திருவள்ளுவர் சிலை – இசைக் கருவிகள் – மிருதங்கம், பறை, வீணை, யாழ், நாதஸ்வரம் – தமிழர்களின் சமூக பொருளாதார வாழ்வில் கோவில்களின் பங்கு.

அலகு 3	நாட்டுப்புறக் கலைகள் மற்றும் வீர விளையாட்டுகள்	3

தெருக்கூத்து கரகாட்டம், வில்லுப்பாட்டு, கணியான் கூத்து, ஒயிலாட்டம், தோல்பாவைக் கூத்து, சிலம்பாட்டம், வளரி, புலியாட்டம், தமிழர்களின் விளையாட்டுகள்.

அலகு 4	தமிழர்களின் திணைக் கோட்பாடுகள்	3

தமிழகத்தின் தாவரங்களும் விலங்குகளும் – தொல்காப்பியம் மற்றும் சங்க இலக்கியத்தில் அகம் மற்றும் புறக் கோட்பாடுகள் – தமிழர்கள் போற்றிய அறக்கோட்பாடு – சங்ககாலத்தில் தமிழகத்தில் எழுத்தறிவும் கல்வியும் – சங்ககால நகரங்களும் துறைமுகங்களும் – சங்ககாலத்தில் ஏற்றுமதி மற்றும் இறக்குமதி – கடல்கடந்த நாடுகளில் சோழர்களின் வெற்றி.

அலகு 5	இந்திய தேசிய இயக்கம் மற்றும் இந்திய பண்பாட்டிற்குத் தமிழர்களின் பங்களிப்பு	3

இந்திய விடுதலைப்போரில் தமிழர்களின் பங்கு – இந்தியாவின் பிறப்பகுதிகளில் தமிழ்ப் பண்பாட்டின் தாக்கம் – சுயமரியாதை இயக்கம் – இந்திய மருத்துவத்தில், சித்த மருத்துவத்தின் பங்கு – கல்வெட்டுகள், கையெழுத்துப்படிகள் – தமிழ்ப் புத்தகங்களின் அச்சு வரலாறு.

TOTAL – 15 PERIODS

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

FS 68172

Regulations 2022

Batch 2022-2023 - II Semester

Batch 2023-2024 onwards - I Semester

(Common to all B.E./B.Tech. Programmes)

Course code	Course Name	Periods/week			Credit	Maximum marks
		L	T	P	C	
22HS11001	**Heritage of Tamils**	1	0	0	1	100

UNIT-I	**LANGUAGE AND LITERATURE**	3

Language Families in India - Dravidian Languages – Tamil as a Classical Language - Classical Literature in Tamil – Secular Nature of Sangam Literature – Distributive Justice in Sangam Literature - Management Principles in Thirukural - Tamil Epics and Impact of Buddhism & Jainism in Tamil Land - Bakthi Literature Azhwars and Nayanmars - Forms of minor Poetry - Development of Modern literature in Tamil - Contribution of Bharathiyar and Bharathidhasan

UNIT-II	**HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**	3

Hero stone to modern sculpture - Bronze icons - Tribes and their handicrafts - Art of temple car making - - Massive Terracotta sculptures, Village deities, Thiruvalluvar Statue at Kanyakumari, Making of musical instruments - Mridhangam, Parai, Veenai, Yazh and Nadhaswaram - Role of Temples in Social and Economic Life of Tamils.

UNIT-III	**FOLK AND MARTIAL ARTS**	3

Therukoothu, Karagattam, Villu Pattu, Kaniyan Koothu, Oyillattam, Leather puppetry, Silambattam, Valari, Tiger dance - Sports and Games of Tamils.

UNIT-IV	**THINAI CONCEPT OF TAMILS**	3

Flora and Fauna of Tamils & Aham and Puram Concept from Tholkappiyam and Sangam Literature - Aram Concept of Tamils - Education and Literacy during Sangam Age - Ancient Cities and Ports of Sangam Age - Export and Import during Sangam Age - Overseas Conquest of Cholas.

UNIT-V	**CONTRIBUTION OF TAMILS TO INDIAN NATIONAL MOVEMENT AND INDIAN CULTURE**	3

Contribution of Tamils to Indian Freedom Struggle - The Cultural Influence of Tamils over the other parts of India – Self-Respect Movement - Role of Siddha Medicine in Indigenous Systems of Medicine – Inscriptions & Manuscripts – Print History of Tamil Books.

TOTAL HOURS	**15**

TEXT BOOK AND REFERENCE BOOKS	
1.	தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2.	கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

MAHENDRA ENGINEERING COLLEGE (Autonomous)-Syllabus						R 2022
DEPARTMENT:	SCIENCE & HUMANITIES		Programme Code & Name			PHYSICS LABORATORY
SEMESTER – I & II						
COURSE CODE	**COURSE NAME**	**HOURS/WEEK**			**CREDIT**	**MAXIMUM MARKS**
22PY12001	**PHYSICS LABORATORY (FOR ALL BRANCHES)**	**L**	**T**	**P**	**C**	**100**
		0	0	3	1.5	
Objective(s)	To provide exposure to the students with hands on experience on various basic Physics practices for all branches.					
OUTCOMES	• The hands on exercises undergone by the students will help them to apply physics principles • Principles of optics and Liquid to evaluate engineering properties of materials.					

1. (a) Determination of Wavelength, and particle size using Laser
   (b) Determination of acceptance angle in an optical fiber.
2. Determination of velocity of sound and compressibility of liquid – Ultrasonic interferometer.
3. Determination of Thickness of a thin wire-Air Wedge
4. Determination of wavelength of mercury spectrum – spectrometer grating
5. Determination of Young's modulus by Non uniform bending method
6. Determination of viscosity of liquid – Poiseuille‟s method
7. Determination of Rigidity modulus -Torsional Pendulum
8. Determination of Band gap of a semiconductor-PN Diode
9. Determination of Young's modulus by Uniform bending method

(Choose Any 7 Experiments)

REFERENCES	
1.	Physics Laboratory Manual (2019), Department of Physics, Mahendra Engineering College, Namakkal.
2	Geeta Sanon, BSc Practical Physics, 1st Edn. (2007), R. Chand & Co.
3	B. L. Worsnop and H. T. Flint, Advanced Practical Physics, Asia Publishing House, New Delhi.
4	Indu Prakash and Ramakrishna, A Text Book of Practical Physics, Kitab Mahal, New Delhi.
5	D. P. Khandelwal, A Laboratory Manual of Physics for Undergraduate Classes, Vani Publication House, New Delhi.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO2	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Average	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Computer Science and Engineering**	**Programme Code**	**1031**

II Semester

Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22CS23001	**PROBLEM SOLVING TECHNIQUES IN C LABORATORY (Common to All Branches)**	**0**	**0**	**3**	**1.5**	**100**

Objective(s)	Students will try: • Understand interfacing components of PC Motherboard. • Expertise in developing applications using Office Packages. • Formulate problems and implement algorithms using Raptor tool. • Make use of loops and functions in C. • Understand different types of statements, structures, unions and files.
Outcome(s)	Students will be able to: • Identify the interfacing components of PC. • Demonstrate the applications of Office Packages. • Obtain solutions for the real world problems using Raptor Tool. • Develop programs using decision making statements, loops and functions. • Apply structures, unions and files various types of statements for problem solving in C

LIST OF EXPERIMENTS

1	Study and Identification of PC Motherboard and its Interfacing Components .
2	Prepare a Bio-data using Word Processor with Appropriate age, text and Table formatting options and send the same to recipients using Mail Merge
3	Create budget planning of your family with cell referencing, formulae, conditional formatting using Excel
4	Create a program flow to illustrate the use of Variables and Constants using Scratch Tool
5	Construct flowchart to find the Factorial for a given number using Raptor
6	Students mark generation using decision statements
7	Calculator using switch statement
8	Prime number generation and to check whether the number is Armstrong or not using looping
9	Greatest number using array (one dimensional)
10	Matrix addition / multiplication using array (two dimensional)
11	String functions
12	Factorial calculation and fibonacci series using function
13	Student mark sheet using structures
14	Copy text from one file to other file
	Total hours to be taught **30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	2	2	-	-	-	3	2	2	2	2	3	2	-
CO2	2	2	3	2	2	-	-	3	2	2	2	2	3	2	-
CO3	2	2	3	2	2	-	-	3	2	2	2	2	3	2	-
Average	**2**	**2**	**2.6**	**2**	**1.3**	**-**	**-**	**3**	**2**	**2**	**2**	**2**	**3**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

FS 68172

	Regulations 2022						
	II Semester						
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22EN11001(R)	Communicative English	3	0	0	3	HS
2	22MA12201	Engineering Mathematics –II	3	1	0	4	BS
3	22CY12001	Chemistry For Engineering	3	0	0	3	BS
4	22GE13001	Engineering Graphics and Design	3	0	2	4	ES
5	22IT14201	Information Technology Essentials	3	0	0	3	PC
6	22HS11002	Tamils and Technology	1	0	0	1	HS
	PRACTICAL						
6	22CY22001	Chemistry Laboratory	0	0	3	1.5	BS
7	22IT24201	Information Technology Essentials Laboratory	0	0	3	1.5	PC
8	22EN21001 (R)	Personality Development Practice Laboratory	0	0	2	1	EEC
		TOTAL	**16**	**01**	**10**	**22**	

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

SYLLABUS - REGULATION - 2022

FS 68172

SEMESTER – I (Non-Circuit Branches & ECE) **SEMESTER- II (Circuit Branches except ECE)**

Course Code	Course Name	Hours / Week			Credit	Maximum Marks
		L	T	P	C	
22EN11001	**COMMUNICATIVE ENGLISH** (Common to all B.E/B.Tech Degree Programmes)	3	0	0	3	100

Objectives	• To help learners to improve their knowledge of grammar • To enable them to use vocabulary appropriately in different academic and professional contexts • To support learners to acquire listening and speaking skills • To facilitate them to develop their reading skills by familiarizing different types of reading strategies • To equip them with writing skills needed for academic as well as professional context
Outcomes	At the end of the course, the learners will be able to • Recognize and comprehend the professional materials in English • Develop vocabulary skills and use words appropriately in different academic contexts. • Analyze and interpret the data with correct usage of grammar • Acquire effective LSRW skills with emerging technology • Demonstrate strong communication skills in both personal and professional life

UNIT I	**9 Hrs**
Listening- Listening to Short Conversations (Formal and Informal) **Speaking** – Introducing Oneself and Others **Reading** – Skimming and Scanning-Reading Comprehension Passages and Answering Multiple Choice Questions **Writing** - Leave/On Duty application, Bonafide Certificate-requisition, Check list, Instructions **Grammar & Vocabulary** – Parts of Speech, Articles, Prefixes and Suffixes	
UNIT II	**9 Hrs**
Listening – Listening to Telephonic Conversations **Speaking** –Greetings and Welcome Address **Reading** – Predicting the Content of a Given Article – Newspaper Articles **Writing**- Recommendations, Composing E-Mail, Letter Writing- Invitation letter **Grammar & Vocabulary** – Sentence Pattern, Tenses, British Terms and American Equivalents	
UNIT III	**9 Hrs**
Listening - Listening to Talks and Note taking **Speaking** – Role Play **Reading** –Cloze Reading and Fill up the Gaps **Writing** - Letter Writing – Permission Letter (In-Plant Training/Industrial Visit), Business letters- Calling for Quotation and Placing Order **Grammar & Vocabulary** –If Conditionals, Abbreviations and Acronyms	
UNIT IV	**9 Hrs**

Listening - Listening to Situation Based Dialogues **Speaking** – Talking part in Casual Conversation **Reading** - Reading Advertisements **Writing** – Paragraph Writing, and Job Application **Grammar & Vocabulary** – Concord, Gerunds and Infinitives, Synonyms and Antonyms	
UNIT V	**9 Hrs**
Listening – Listening to Academic lectures **Speaking** - Describing Objects **Reading** – Transcoding (Conversion of Flow Chart, Bar chart, Pie chart into a paragraph) **Writing** –Review writing (Films & Books), Essay Writing **Grammar & Vocabulary** – Modal Verbs, Voice- Active Voice, Passive Voice and Impersonal Passive, Question tags and Nominal Compounds	
Total Hours	**45**

Textbook:	
1	N.P.Sudharshana and C.Savitha, *English For Technical Communication*, Cambridge University Press, New Delhi, 2016
2	Murphy, Raymond, *English Grammar in Use*, Fifth Edition. Cambridge University Press, New Delhi, 2019
References:	
1	Meenakshi Raman and Sangeeta Sharma., *Technical Communication: Principles and Practice*, *Third Edition*. OUP, New Delhi, 2015.
2	Ashraf Rizvi. *Effective Technical Communication*, Tata McGraw Hill, 2017.
3	Jack C. Richards with Jonathan Hull and Susan Proctor, *Interchange*. 4th Edition, Cambridge University Press, New Delhi, 2016
Extensive Reading:	
1	Khera, Shiv. *You can Win*. Macmillan, Delhi. 1998
Websites:	
1	http://www.englishclub.com
2	http://www.talkenglish.com
3	https:// www.ted.com/talks
4	https://nptel.ac.in/

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	-	-	-	-	-	-	-	2	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	-	3	3	-	2	-	-	-
CO3	-	-	-	-	-	-	-	-	3	3	-	2	-	-	-
CO4	-	-	-	-	-	-	-	-	3	3	-	2	-	-	-
CO5	-	-	-	-	-	-	-	-	3	3	-	2	-	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.8**	**2.8**	**-**	**2**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**MATHEMATICS**	**Programme Code**	

SEMESTER – II

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22MA12201	**ENGINEERG MATHEMATICS - II (Common to all Branches)**	**3**	**1**	**0**	**4**	**100**

Objectives	To enable the students to: • Define vector function, operators and working procedure to evaluate line, surface and volume integrals. • Learn Laplace transform, inverse Laplace transform and its properties to solve differential equations. • Learn about Fourier transforms, inverse Fourier transform and its properties and apply convolution theorem and Parseval's identity to various functions • Know about functions of a complex variable, properties and problems involving conformal mapping. • Learn about Taylor's and Laurent's series expansion of complex functions and the process of evaluating complex integrals.
Outcomes	At the end of the course the students will be able to • Solve problems related to vector differentiation, line, surface and volume integrals and theorems involving them. • Describe Laplace transform and its properties inverse Laplace transform and the solution of linear differential equation using Laplace transform techniques. • Solve Fourier transforms , inverse Fourier transform and its properties and apply convolution theorem and Parseval's identity to various functions • Solve Analytic functions, harmonic functions, conformal mapping and its applications. • Expand the functions as Taylor's and Laurent's series and evaluate the complex integrals.

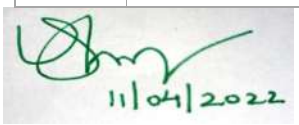
UNIT-I	**VECTOR CALCULUS**	(9+3Hrs)

Gradient Divergence and Curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stokes' theorem (excluding proofs).Verification and application in evaluating line, surface and volume integrals.

UNIT -II	**LAPLACE TRANSFORM**	(9+3Hrs)

Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem, solving ODEs by Laplace Transform method.		
UNIT-III	**FOURIER TRANSFORMS**	(9+3Hrs)
Fourier integral theorem (statement only)-Fourier transform pair (infinite) - Sine and cosine transforms-Properties-Transform of simple functions-Convolution theorem- Parseval's identity.		
UNIT-IV	**ANALYTIC FUNCTIONS**	(9+3Hrs)
Functions of a complex variable, Cauchy-Riemann equations – Analytic functions – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: w= z+c, cz, 1/z, and Bilinear transformation.		
UNIT -V	**COMPLEX INTEGRATION**	(9+3Hrs)
Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula(without proof) – Taylor and Laurent expansions –Types of Singularities-Singular points – Residues – Residue theorem(without proof) – Application of residue theorem to evaluate real integrals – Contour integration.		
	Total	**(L:45+T:15): 60**

TEXT BOOK :	
1	Veerarajan T & Dr.K.Kannan., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2019.
2	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44th Edition, 2017.
REFERENCES:	
1	Erwin kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2018.
2	V. Krishnamurthy, V. P. Mainra and J. L. Arora, " An introduction to Linear Algebra" , Affiliated East-West press, 2005.
3	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Ninth Edition,2014.



Member

Prof. K.SHANMUGAM
Head Department of Mathematics.
Mahendra Engineering college

Subject Expert

Dr. K. KANNAN
Dean,
School of Humanities & Science,
Sastra University

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Average	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

DEPARTMENT:	SCIENCE &HUMANITIES	Programme Code	

II Semester

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22CY12001	CHEMISTRY FOR ENGINEERING	3	0	0	3	100

Objectives	To make the students familiar with: 1. The treatment of water for potable and industrial purposes. 2. Provides students with an opportunity to identify different types of polymers in our surroundings. 3. The basic principles and preparatory method of Nanomaterial 4. Different types of batteries with Construction and application. 5. The principles of corrosion and control techniques.
Outcomes	At the end of the course the student will be able to 1. Explain the basic principles of water quality parameters, their analysis and various water treatments Process for domestic and industrial applications. 2. Classify the reaction mechanism, synthesis and application of polymers. 3. Develop the basic concepts of nanoscience and nanotechnology in designing the nanomaterial for Engineering and Technology. 4. Compare the working principles of batteries and Supercapacitors with recycling methods. 5. *Inspect* the principles of corrosion in metals with control measures.

UNIT-I	WATER TECHNOLOGY	9

Water: Sources and impurities - Water quality parameters - Definition and significance of - colour, odour, turbidity, pH, hardness, alkalinity, flouride and arsenic - Domestic water treatment – disinfection methods (Chlorination, ozonation, UV treatment) – Boiler feed water – requirements – Decreased efficiency of using hard water in boilers – external conditioning – demineralization process, Electro dialysis process, reverse osmosis - Internal conditioning (phosphate, calgon and carbonate conditioning methods) – WHO and BIS guidelines for drinking water.

UNIT-II	POLYMER CHEMISTRY	9

Introduction: Classification of polymers – Natural and synthetic - Thermoplastic and Thermosetting - Functionality – Degree of polymerization - Types and mechanism of polymerization: Addition (Free Radical); condensation and copolymerization - Properties of polymers: Tg, Tacticity, Molecular weight - weight average, number average and polydispersity index - Preparation, properties & applications of selected

commodity and engineering polymers (Polystyrene, Teflon, Bakelite and Epoxy resin).		
UNIT-III	**NANOCHEMISTRY**	9
Introduction: Basics - difference between molecules, nanoparticles and bulk materials - size-dependent properties (optical, electrical, mechanical and magnetic) - Types of nanomaterials: Definition, properties and uses of –nanoparticles , nanocluster, nanorod, nanotube and nanowire - Synthesis of nanomaterials: laser ablation, Chemical vapour deposition, electro deposition, precipitation, hydrothermal - Applications (Medicine, Agriculture and Electronics).		
UNIT-IV	**ENERGY STORAGE DEVICE**	9
Types of batteries - Primary battery - dry cell - Secondary battery - lead acid battery and Lithium ion batteries- Fundamentals, Construction and application - Thin Film solid state batteries – Recycling of Na-Air batteries – Battery used in EV application - Super Capacitors(Storage principle and types)..		
UNIT-V	**CORROSION & ITS CONTROL**	9
Corrosion: Chemical corrosion – Pilling Bedworth rule – electrochemical corrosion – different types – galvanic corrosion – differential aeration corrosion - Vapour Deposition Techniques - Physical and Chemical Vapour Deposition – factors influencing corrosion – corrosion control – sacrificial anode and impressed cathodic current methods – corrosion Inhibitors.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1.	Jain P.C. and Monica Jain, “Engineering Chemistry”, Dhanpat Rai Publishing Company (P) Ltd., New Delhi, 2018
2.	Dr.C.K.Charles and Dr.G.Ramachandran, “Applied Chemistry”, CARS Publishers,Chennai,2015
3.	David Linden and Thomas B. Reddy “Handbook of Batteries”, Third Edition McGraw-Hill New York.
REFERENCES:	
1.	Dara S.S, Umare S.S, “Engineering Chemistry”, S. Chand & Company Ltd., New Delhi 2018
2.	Sivasankar B., “Engineering Chemistry”, Tata McGraw-Hill Publishing Company, Ltd., New Delhi, 2008.
3.	Kannan P., Ravikrishnan A., “Engineering Chemistry”, Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2019
4.	T.R. Crompton “Battery Reference Book” Third Edition, British Library Cataloguing in Publication Data, 2000.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	1	-	-	-	-	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	2	-	-	-
CO3	2	1	-	1	-	-	-	-	-	-	-	2	-	-	-
CO4	2	1	-	-	-	-	-	-	-	-	-	2	-	-	-
CO5	2	3	-	1	-	-	-	-	-	-	-	1	-	-	-
Average	**2**	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.4**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Mechanical Engineering**				**Programme Code**	**1081**
II Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22GE13001	**Engineering Graphics and Design** (Common to All Branches)	3	0	0	3	**100**
Objective(s)	• Increase ability to communicate with engineers through drawing skills as per the standard, • Learn to sketch and take field dimensions, • Learn to take data and transform it into graphic drawings, • Learn basic Autocad skills, • Learn basic engineering drawing formats.					
Outcome(s)	**Upon completion of this course , students will be able to** • Create dynamic website/web based applications using HTML, PHP, and MYSQL database. • Design websites that meet specified needs and interests using basic elements to control layout and style. • Debug the programs by applying concepts and error handling techniques of HTML, JavaScript, PHP and MYSQL. • Understand the basic concepts of data communications and networking. • Identify the fundamental concepts and key issues in the design of commonly used applications.					
Examination Pattern: Theoretical Mode						
UNIT-I	**Plane Curves and Free Hand Sketching**					9
Introduction to engineering drawing and standards, Construction of ellipse, Parabola and hyperbola by eccentricity method – Construction of cycloid –involutes, define tangents and normal. **Free Hand Sketching:** Representation of Three Dimensional objects – General principles of orthographic projection – Need for importance of multiple views and their placement – First angle projection – layout views – Developing visualization skills through free hand sketching of multiple views from pictorial views of objects.						
UNIT-II	**Projection of Points, Lines and Plane Surfaces**					9
Projection of points and straight lines located in the first quadrant – Determination of true lengths and true inclinations – Projection of polygonal surface and circular lamina inclined to both reference planes.						

UNIT-III	Introduction to CADD	9
Basics of CADD- Working with drawing –Editing, Modifying commands and Layers. Projection of simple solids like prisms, pyramids, cylinder and cone when the axis is inclined to one reference plane by change of position method.		
UNIT-IV	**Section of Solids and Development of Surfaces**	9
Sectioning of above solids in simple vertical position by cutting planes inclined to one reference plane and perpendicular to the other – Obtaining true shape of section. Development of lateral surfaces of simple and truncated solids – Prisms, pyramids, cylinders and cones –Development of lateral surfaces of solids with cylindrical cutouts, perpendicular to the axis..		
UNIT-V	**Isometric and Perspective Projections**	9
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. Perspective projection of prisms, pyramids and cylinders by visual ray method.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1.	Bhatt,N.D; Panchal,V.M "Engineering Drawing:Plane and solid Geometry" Charotar Publishing House Pvt. Ltd.Charotar Publishing House Pvt. Ltd.Gujarat 388001
2.	N S Parthasarathy and Vela Murali, "Engineering Drawing" Oxford University Press 2015.
3.	K. Venugopal & V. Prabhu Raja, "Engineering Graphics", New Age International (P) Limited, 2011
4.	K. V. Natrajan, "A text book of Engineering Graphics", Dhanalakshmi Publishers, Chennai, 2012
REFERENCES:	
1.	M.B. Shah and B.C. Rana, "Engineering Drawing", Pearson Education 2005.
2.	K. R. Gopalakrishnana, "Engineering Drawing" (Vol.I&II), Subhas Publications 1998.
3.	Basant Agarwal and Agarwal C.M., "Engineering Drawing", Tata McGraw Hill Publishing Company Limited, New Delhi, 2008.
4.	Dhananjay A.Jolhe, "Engineering Drawing with an introduction to AutoCAD" Tata McGraw Hill Publishing Company Limited 2008.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	1	-	-	-	-	-	-	-	1	2	2	-
CO2	3	-	-	1	-	-	-	-	-	-	-	1	2	2	-
CO3	3	-	-	1	-	-	-	-	-	-	-	1	2	2	-
CO4	3	-	-	-	-	-	-	-	-	-	-	1	2	2	-
CO5	3	-	-	1	-	-	-	-	-	-	-	1	2	2	-
Average	**3**	-	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**2**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**				**Programme Code**	**2071**
II Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT14201	**INFORMATION TECHNOLOGY ESSENTIALS**	3	0	0	3	**100**
Objective(s)	• To design and develop web pages using HTML and CSS. • To understand the general concepts of PHP scripting language and MySQL Functionalities for the development of simple data-centric applications. • To provide a basic knowledge of computer hardware and software. • To familiarize with the basic taxonomy and terminology of computer networking and mobile communications. • To understand various types of information systems and their complexities.					
Outcome(s)	**Upon completion of this course , students will be able to** • Create dynamic website/web based applications using HTML, PHP, and MYSQL database. • Design websites that meet specified needs and interests using basic elements to control layout and style. • Debug the programs by applying concepts and error handling techniques of HTML, JavaScript, PHP and MYSQL. • Understand the basic concepts of data communications and networking. • Identify the fundamental concepts and key issues in the design of commonly used applications.					
UNIT-I	**WEB AND SCRIPTING ESSENTIALS**					9
Internet Basics – Browser Fundamentals – Authoring Tools – Introduction to HTML5 – HTML5 Tags – HTML5 Forms – Cascading Style Sheets (CSS3) Fundamentals – Need for Scripting Languages.						
UNIT-II	**SERVER-SIDE ESSENTIALS (PHP)**					9
Introduction to PHP – PHP Variables – Constants – Operators – Flow Control and Looping – Arrays – Strings – Functions – File Handling – Exception Handling – PHP and HTML – Database Management – Introduction to MySQL – MySQL Commands – MySQL Database Creation – Connecting MySQL and PHP – Querying MySQL Database with PHP – Session and Cookies.						
UNIT-III	**HARDWARE ESSENTIALS**					9
Motherboard – Networking Cards – Graphics Card – Processors – Hard Drive – USB Port – Monitor Ports – Servers – Types of Servers – Web Server – Database Server – Data Center and Cloud Servers – Server Management.						

UNIT-IV	NETWORK ESSENTIALS	9
Basics of Computer System – Data Transmission Fundamentals – Communication Medium – Fundamentals of Computer Networking – Types of Computer Networks – Network Topologies – Network Standards: OSI Model, TCP/IP Model – Network Protocols: TCP, UDP, IP – Network Components – Introduction to Mobile Communication – Generations of Cellular Networks – GSM.		
UNIT-V	**APPLICATION ESSENTIALS**	9
Creation of Simple Interactive Applications – Simple Database Applications – Introduction to Information Systems – Personal Information System – Information Retrieval System – Social Networking Applications.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Robin Nixon, "Learning PHP, MySQL, JavaScript, CSS & HTML5: A Step-by-Step Guide to Creating Dynamic Websites", O'Reilly Media, Inc, 2014.
2	James Kurose and Keith Ross, "Computer Networking: A Top-Down Approach", Seventh Edition, 2017.
REFERENCES:	
1	Steven Holzner, "PHP: The Complete Reference", Fifth Edition, Mc Graw Hill, 2017.
2	Niederst Robbins, Jennifer, "Learning Web Design: A Beginner's Guide to HTML, CSS, Javascript, and Web Graphics", Fifth Edition, O'Reilly Media, 2018.
3	Laura Lemay, Rafe Colburn, Jennifer Kyrnin, "Mastering HTML, CSS & JavaScript Web Publishing", BPB Publications, 2016.
4	Douglas E. Comer, "Computer Networks and Internets", Sixth Edition, Prentice Hall, 2015.
5	Jochen Schiller, "Mobile Communications", Pearson Education, 2012.
6	R. Kelly Rainer, Casey G. Cegielski, Brad Prince, "Introduction to Information Systems", Fifth Edition, Wiley Publication, 2014.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	-	-	-	3	3	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	3	3	-	-	-
CO3	3	-	-	-	-	-	-	-	-	-	3	3	2	-	-
CO4	3	-	-	-	-	-	-	-	-	-	3	3	2	-	-
CO5	3	-	-	-	-	-	-	-	-	-	3	3	2	-	-
Average	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**1.2**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

FS 68172

Regulations 2022

Batch 2022-2023 - III Semester
Batch 2023-2024 onwards - II Semester
(Common to all B.E./B.Tech. Programmes)

Course code	Course Name	Periods/week			Credit	Maximum marks
		L	T	P	C	
22HS11002	Tamils and Technology	1	0	0	1	100

UNIT-I	**WEAVING AND CERAMIC TECHNOLOGY**	3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT-II	**HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**	3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT-III	**MANUFACTURING TECHNOLOGY**	3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold-Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT-IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT-V	**SCIENTIFIC TAMIL & TAMIL COMPUTING**	3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL HOURS	**15**

TEXT BOOK AND REFERENCE BOOKS	
1.	தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2.	கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

MAHENDRA ENGINEERING COLLEGE (Autonomous)-Syllabus						R 2022
DEPARTMENT:	**SCIENCE & HUMANITIES**	**Programme Code & Name**				**CY & CHEMISTRY**
SEMESTER – I (For Non Circuit Branches) & SEMESTER – II (For Circuit Branches)						
COURSE CODE	**COURSE NAME**	**HOURS/WEEK**			**CREDIT**	**MAXIMUM MARKS**
22CY22001	**CHEMISTRY LABORATORY**	**L**	**T**	**P**	**C**	**100**
		0	0	3	1.5	
Objectives	▪ Educate the theoretical concepts experimentally ▪ To impart skills in measurements. ▪ To design and plan the experimental procedure and to record and process the results. ▪ To reach non trivial conclusions of significant of the experiments.					
Outcomes	On completion of this course, students will have the knowledge in ▪ Demonstrate laboratory practices, handling glassware, equipment, and chemical reagents. ▪ Experiment with different types of instruments for analysis of materials using small quantities Involved for quick and accurate results. ▪ Analyze different types of titrations for estimation of materials using more quantities involved for good results.					
1.	Determination of Total, Temporary & Permanent hardness of water using EDTA method.					
2.	Determination of the Alkalinity level of a water sample.					
3.	Determination of Chloride content of water sample by Argentometry.					
4.	Determination of DO content of water sample using Winkler's method.					
5.	Determination of Rate of Corrosion of Mild steel by Weight loss method.					
6.	Determination of molecular weight of polyvinyl alcohol using Viscometry.					
7.	Estimation of Iron content of the given solution using Potentiometry.					
8.	Determination of strength of given hydrochloric acid using pH meter.					
9.	Conductometric titration a strong acid vs strong base.					
10.	Determination of strength of acids in a mixture using Conductometry.					
11.	Estimation of sulphate in a solution using Conductometry.					
12.	Estimation of iron content of the water sample using Spectrophotometry. (1,10- phenanthroline / thiocyanate method) – (**DEMO ONLY**)					
TEXT BOOKS						
1.	Chemistry lab Manual, Department of Chemistry, Mahendra Engineering College, Mallasamudram, 2019.					
2.	Chemistry lab Manual, Department of Chemistry, Mahendra Engineering College, Mallasamudram, 2017.					
REFERENCES						
1.	Applied chemistry theory and practice by O. P. Vermani and A. K. Narula, second edition.					
2.	Furniss B.S. Hannaford A.J, Smith P.W.G and Tatchel A.R., "Vogel's Textbook of practical organic chemistry", LBS Singapore (1996).					
3.	Kolthoff I.M. and Sandell E.B. et al. Quantitative chemical analysis, Mcmillan, Madras 1980					

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	2	2	-	-	-	-	-	-
CO2	2	-	-	2	-	-	-	2	2	-	-	-	-	-	-
CO3	2	3	-	2	-	-	-	2	2	-	-	-	-	-	-
Average	**2**	**1**	**-**	**1.3**	**-**	**-**	**-**	**2**	**2-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Information Technology	Programme Code & Name	

II Semester

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
22IT24201	INFORMATION TECHNOLOGY ESSENTIALS LABORATORY	0	0	3	1.5	100

Objective(s)	• To design and develop static web pages using HTML5. • To create attractive web pages using CSS (internal & external style sheets). • To introduce the JavaScript/Angular JS for client-side validation of the web forms. • To understand the concepts of PHP programming. • To introduce PHP scripting language and MySQL functionalities for the development of simple data-centric applications.
Outcome(s)	**Upon completion of this course, students will be able to** • Design and develop static web pages by using the markup languages that meet the specified needs and interests. • Validate HTML forms developed using the JavaScript/Angular JS. • Create dynamic websites/web based applications using HTML, PHP, and MYSQL database. • Debug the programs by applying concepts and error handling techniques of HTML, JavaScript, PHP and MYSQL. • Develop responsive websites using the programming languages and techniques associated with the World Wide Web.

LIST OF EXPERIMENTS

1.	Creation of interactive web sites - Design using HTML and authoring tools.
2.	Design of static webpage primarily with text and CSS.
3.	Creation of simple PHP scripts - Dynamism in web sites.
4.	Design the HTML forms (text boxes, text areas, radio buttons, check boxes and other elements by understanding the input types and specified needs).
5.	Handling multimedia content in web sites.
6.	Include image/audio and video elements in the web pages.
7.	Validate the HTML form elements by creating small client-side validation scripts using JavaScript/Angular JS.
8.	Create small PHP scripts to manipulate data using various operators and PHP functions and display the results.
9.	Write two different PHP scripts to demonstrate passing variables to a URL.
	TOTAL HOURS **30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	-	-	2	2	-	-	2	1	-	-	2	-	-	-
CO2	3	-	-	2	2	-	-	2	1	-	-	3	-	-	-
CO3	3	-	-	2	2	-	-	2	1	-	-	3	-	-	-
Average	**3**	**-**	**-**	**2**	**2**	**-**	**-**	**2**	**1**	**-**	**-**	**2.6**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus - Regulation 2022

Department	**English**

I Semester – Non-Circuit Branches & ECE
II Semester – Circuit Branches (Except ECE)
(Common to all B.E./B.Tech. Programmes)

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22EN21001(R)	**Personality Development Practice Laboratory**	0	0	2	1	**100**

Objectives	• To develop listening and speaking skills of students for a variety of purposes like making presentations, attending interviews and participating in discussions • To enhance the non-verbal and social interaction skills of students for becoming effective communicators • To enable learners to hone their linguistic (LSRW) skills with the help of Technology
Outcomes	**At the end of the course, the students will be able to** • Understand the language proficiency and its techniques • Prepare the resume with organized details • Develop soft skills to excel in their career

LIST OF EXERCISES

1.	Introduction to LSRW Skills
2.	Listening Comprehension
3.	Reading Comprehension
4.	Common Errors in English
5.	Interview Skills
6.	Presentation skills
7.	Body Language
8.	Group Discussion
9.	Soft Skills (Self-Confidence, Team Work, Time Management, Adaptability, Openness to Criticism)
10.	Creative Writing

Total Hrs : 45

REFERENCES:

1. Joshi, Manmohan, ***Soft Skills***, 1st Edition. Bookboon, 2017

2. Raman, Meenakshi & Sangeeta Sharma. ***Technical Communication: Principles and Practice,***
Ed.III, Oxford University Press, New Delhi. 2015

Online Websites:

https://
www.ted.com
/talks
https://quizziz
.com
www.pdfdriv
e.com

Activity:
Worksheets for relevant topics

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	-	-	-	-	-	-	-	2	3	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	2	3	3	-	2	-	-	-
CO3	-	-	-	-	-	-	-	2	3	3	-	2	-	-	-
Average	**-**	-	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2.6**	**-**	**2**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

FS 68172

DEPARTMENT OF INFORMATION TECHNOLOGY

Regulations 2022

III Semester

Sl. No.	Course code	Course Title	L	T	P	C	Category
	THEORY						
1	22MA12301	Probability And Discrete Mathematics	3	1	0	4	BS
2	22IT14301	Computer Architecture and Organization	3	0	0	3	PC
3	22IT14302	Data Structures and Algorithms	3	1	0	4	PC
4	22IT14303	Python Programming	3	0	0	3	PC
5	22MA12305	Quantitative Aptitude and Problem Solving Skills (Open Elective- 1)	3	0	0	3	OE
6	22CY11001	Environmental Science And Engineering	3	0	0	-	MC
7	22HS 11002	Tamils and Technology	1	0	0	1	HS
	PRACTICAL						
8	22IT24301	Data Structures and Algorithms Laboratory	0	0	3	1.5	PC
9	22IT24302	Python Programming Laboratory	0	0	3	1.5	PC
		TOTAL	**19**	**2**	**6**	**21**	

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**MATHEMATICS**	**ProgrammeCode**				
SEMESTER – III						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22MA12301	**Probability and Discrete Mathematics (CSE, CYBER , IT AI&DS)**	3	1	0	4	**100**
Objectives	To enable the students to, • Gain knowledge of random variables and various standard distributions and their properties. • Familiarize the students with two dimensional discrete and continuous random variables, correlation and regression analysis. • Study the types of large sample tests and small sample tests. • Create simple mathematical proofs using positions and connectives and doing truth table analysis. • Study various types of graphs including Euler graphs and Hamiltonian graphs.					
Outcomes	At the end of the course the students will be able to • Apply the ideas of probability and random variables and various discrete and continuous probability distributions and their properties which can describe real life phenomena • Solve the problems involving more than one random variables. • Analyze testing of hypothesis of large samples and small samples. • Create simple mathematical proofs using positions and connectives and doing truth table analysis. • Develop the given problem as graph terminology and solve with techniques of graph theory.					
UNIT-I	**RANDOM VARIABLES**					**9+3**
Probability Set Theory(Basics)Discrete and continuous random variables – Mathematical Expectation - Moments – Moment generating functions – Binomial, Poisson, Uniform, Exponential and Normal distributions-						
UNIT-II	**TWO - DIMENSIONAL RANDOM VARIABLES**					**9+3**
Joint distributions – Marginal and conditional distributions – Covariance – Correlation and Regression Analysis.						
UNIT-III	**INFERENTIAL STATISTICS**					**9+3**

Test of significance: Large sample test for single proportion, difference of proportions, single mean, difference of means, Small samples test for single mean, difference of means -F-test - Chi-square test for goodness of fit and independence of attributes.		
UNIT-IV	**PROPOSITIONAL CALCULUS**	**9+3**
Propositions – Logical connectives – Compound propositions – Conditional and biconditional propositions – Truth tables – Tautologies and contradictions – Normal forms – Principal conjunctive and disjunctive normal forms – Rules of inference – Arguments - Validity of arguments.		
UNIT-V	**GRAPHS AND GROUPS**	**9+3**
Graphs and graph models-Graph terminology and special types of graphs-Representing graphs and graph isomorphism -connectivity-Euler and Hamilton paths. Groups, Semi Groups, Sub Groups,Permutation Groups, Normal Subgroups and homomorphisms - Cosets and Lagrange's theorem		
	Total Hours	**(L:45+T:15): 60**

TEXT BOOKS:	
1	T.Veerarajan, “Discrete Mathematics, with Graph Theroy and Combinatorics”, Tata McGraw Hill,4th Edition, 2017.
2	Milton. J. S. and Arnold. J.C., "Introduction to Probability and Statistics", Tata McGraw Hill, 4th Edition, 2014.
REFERENCES:	
1	Devore. J.L., "Probability and Statistics for Engineering and the Sciences”, Cengage Learning, New Delhi, , 2016.
2	Walpole. R.E., Myers.R.H., Myers. S.L. and Ye. K., "Probability and Statistics for Engineers and Scientists", Pearson Education, Asia , 2016.
3	Bernard Kolman, Robert C. Busby, Sharan Cutler Ross, “ Discrete Mathematical Structures”, Fourth Indian reprint, Pearson Education Pvt Ltd., New Delhi, 2015.
4	Seymour Lipschutz and Mark Lipson, ”Discrete Mathematics”, Schaum’s Outlines, Tata McGraw-Hill Pub. Co. Ltd., New Delhi, Third edition, 2017.

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SubjectExpert
Dr. K.KANNAN
Dean,
School

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	1	-	-	2	-	-	-
CO2	2	-	-	-	-	-	-	-	1	-	-	2	-	-	-
CO3	2	-	-	-	-	-	-	-	1	-	-	2	-	-	-
CO4	2	-	-	-	-	-	-	-	1	-	-	2	-	-	-
CO5	2	-	-	-	-	-	-	-	1	-	-	2	-	-	-
Average	**2**	-	-	-	-	-	-	-	**1**	-	-	**2**	-	-	-

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

III Semester

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT14301	COMPUTER ARCHITECTURE AND ORGANIZATION	3	0	0	3	100

Objective(s)	• To learn the basic structure and operations of a computer. • To learn the arithmetic and logic unit and implementation of fixed-point and floating point arithmetic unit. • To learn the basics of pipelined execution, understand parallelism and multi-core processors. • To understand the memory hierarchies, cache memories and virtual memories. • To learn the different ways of communication with I/O devices.
Outcome(s)	**On Completion of the course, the students should be able to:** • Explain the basics structure of computers, operations and instructions. • Design arithmetic and logic unit. • Understand pipelined execution and design control unit. • Understand the various memory systems and I/O communication. • Explain the different way of communication with I/O devices.

UNIT-I	**BASIC STRUCTURE OF A COMPUTER SYSTEM**	9
Functional Units – Basic Operational Concepts – Performance – Instructions: Language of the Computer – Operations, Operands – Representing Instructions in the computer - Instruction Set Architecture – Instruction And Instruction Sequencing – Addressing Mode – Assembly Language		
UNIT-II	**ARITHMETIC FOR COMPUTERS**	9
Addition and Subtraction – Multiplication – Division – Floating Point Representation – Floating Point Operations –Parallelism and Computer Associativity		
UNIT-III	**PROCESSOR AND CONTROL UNIT**	9
A Basic MIPS implementation – Building a Data path – Control Implementation Scheme – Pipelining – Pipelined data path and control – Handling Data Hazards & Control Hazards – Exceptions.		
UNIT-IV	**PARALLELISIM**	9
Parallel processing challenges – Flynn‘s classification – SISD, MIMD, SIMD, SPMD, and Vector Architectures - Hardware multithreading – Multi-core processors and other Shared Memory Multiprocessors - Introduction to Graphics Processing Units, Clusters, Warehouse Scale Computers and other Message-Passing Multiprocessors.		
UNIT-V	**MEMORY & I/O SYSTEMS**	9
Memory Hierarchy - memory technologies – cache memory – measuring and improving cache performance – virtual memory, TLB‘s – Accessing I/O Devices – Interrupts – Direct Memory Access – Bus structure – Bus operation – Arbitration – Interface circuits - USB.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	David A. Patterson and John L. Hennessy, Computer Organization and Design: The Hardware/Software Interface, Sixth Edition, Morgan Kaufmann / Elsevier, 2020.
2	Carl Hamacher, Zvonko Vranesic, Safwat Zaky and Naraig Manjikian, Computer Organization and Embedded Systems, Sixth Edition, Tata McGraw Hill, 2012.
REFERENCES:	
1	William Stallings, Computer Organization and Architecture – Designing for Performance, Eleventh Edition, Pearson Education, 2020
2	John P. Hayes, Computer Architecture and Organization, Third Edition, Tata McGraw Hill,2012.
3	John L. Hennessey and David A. Patterson, Computer Architecture – A Quantitative Approach, Morgan Kaufmann / Elsevier Publishers, Fifth Edition, 2012.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	2	-	2	2	2	-
CO3	2	3	3	-	-	-	-	-	-	2	-	2	2	2	-
CO4	2	3	3	-	-	-	-	-	-	2	-	2	2	2	-
CO5	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	**2**	1.2	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**1.2**	**1.2**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus						
Department	**Information Technology**	**ProgrammeCode**			**2071**	
III Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
22IT14302	**DATA STRUCTURES AND ALGORITHMS**	**L**	**T**	**P**	**C**	**100**
		3	1	0	4	
Objective(s)	• To understand the basic concepts of ADTs • To learn the linear data structure principles. • To understand the concepts of non linear data structures. • To learn the sorting and searching algorithms. • To Understand the fundamental analysis and time complexity for a given problem					
Outcome(s)	**Upon completion of the course, students will be able to:** • Implement the abstract data types for linear data structures. • Apply the non linear data structures to problem solutions. • Explain the different representation of a graph. • Apply the various searching and sorting algorithms. • To analyze the complexity of algorithms.					
UNIT-I	**LINEAR STRUCTURES**					**9+3**
Data structures - Types of data structures -Abstract data types (ADT) - List ADT - Linked List Implementation - Cursor Based Linked Lists - Applications of Lists - Stack ADT - Queue ADT - Circular QueueImplementation - Applications of Stacks and Queues.						
UNIT-II	**NON LINEAR DATA STRUCTURES – TREES**					**9+3**
Tree ADT – Tree Traversals – Binary Tree ADT – Expression Trees – Applications of Trees – Binary Search Tree ADT –Threaded Binary Trees- AVL Trees – B-Tree – B+ Tree – Heap – Applications of Heap.						
UNIT-III	**NON LINEAR DATA STRUCTURES – GRAPHS**					**9+3**
Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.						
UNIT-IV	**SEARCHING, SORTING AND HASHING TECHNIQUES**					**9+3**
Searching- Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.						
UNIT-V	**ANALYSIS OF ALGORITHM**					**9+3**
Role of algorithm in computing, Growth of functions, Asymptotic notations, Permutations and Combinations, Recurrences, Substitution method, Recursion tree method, Master method, Basics of ProblemClasses: P, NP, NP-Complete, NP-Hard.						
					TOTAL HOURS	**60**

TEXT BOOKS:	
1	M. A. Weiss, “Data Structures and Algorithm Analysis in C”, Second Edition, Pearson Education, January 2002.
2	Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms , Third edition, MIT Press, 2009.
REFERENCES:	
1	https://nptel.ac.in/courses/106/102/106102064/?source=post_page
2	Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education,1983.
3	Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education
4	Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008
5	A. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1998 UNIT III

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	2	2	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	2	2	-	2	2	-
CO3	2	3	3	-	-	-	-	-	-	2	3	-	3	3	-
CO4	2	3	3	-	-	-	-	-	-	2	3	3	3	3	-
CO5	2	3	3	-	-	-	-	-	-	2	3	3	3	2	-
Average	**2**	**2.2**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**		**1.2**	**1.2**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

IIISemester

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT14303	PYTHON PROGRAMMING	3	0	0	3	100

Objective(s)	**The student should be made to:** • Understand the basic principles of Python programming language. • Be exposed with python data structures – list, tuples, and dictionaries. • Learn the basics of python Modules, packages, files and standard library. • Familiar with C++ classes using appropriate Inheritance and design principles. • Understand the concepts of GUI which handles events.
Outcome(s)	**Upon completion of this course , students will be able to:** • Interpret the basic principles of Python programming language. • Manipulate python programs by using the python data structures like lists, dictionaries, tuples, strings and sets. • Classify the commonly used operation involved in files for I/O processing. • Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python • Create GUI which handles events using Python.

UNIT-I	**INTRODUCTION**	9

Python: Features, Installing and Running, variables and Data types, Operators and Expressions, Understanding python blocks, selection structure, while loops -For loop using ranges, string, list and dictionaries - Loop manipulation using pass, continue, break and else - Programming using Python conditional and loop blocks.

UNIT-II	**PYTHON DATA STRUCTURES AND FUNCTIONS**	9

String: string operations, Split and join string,Lists: Traversing a List, List MethodsTuples: Tuple assignment, Tuple methods, Dictionary, set, Functions: Function definition, Arguments and Parameters, Function prototype- Organizing python codes using functions.

UNIT-III	**I/O AND ERROR HANDLING**	9

Python module and packages, File Operations: Open file, Reading and writing files, Command line Arguments, Handling IO Exceptions: Errors, Run Time Errors, The Exception Model, Exception Hierarchy, Handling Multiple Exceptions, Multithreading.

UNIT-IV	**OOPS CONCEPTS**	9

OOPS Concepts, Classes and objects, Creating Classes, Instance Methods, Special Methods, Class Variables, Constructors, Data hiding, Inheritance, Abstraction, Polymorphism, Type Identification, Custom Exception Classes, Iterators, generators and decorators.		
UNIT-V	**DATABASE AND GUI PROGRAMMING**	9
SQL statements for data manipulation, Using SQLite Manager to work with a database, Using Python to work with a database, GUI Programming: Creating a GUI that handles an event, working with components, Creating simple GUI using Tkinter.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Murach's Python Programmingby Michael Urban and Joel Murach, 2016.
2	Mark Lutz, Programming Python, O`Reilly, 4th Edition, 2010.
REFERENCES:	
1	Fundamentals of Python Programming by Richard L. Halterman, 2019.
2	B. Downey, "Think Python – How to Think Like a Computer Scientist", Second Edition, Green Tea Press, 2015.
3	https://onlinecourses.nptel.ac.in/noc21_cs75/course

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	2	3	2	-	-	-	-	-	-	2	-	2	2	2	-
CO3	2	3	2	-	-	-	-	-	-	2	-	2	2	2	-
CO4	2	3	2	-	-	-	-	-	-	2	-	-	-	2	-
CO5	2	-	-	-	-	-	-	-	-	2	-	2	2	-	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**1.2**	**1.2**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRAENGINEERINGCOLLEGE (Autonomous)						
Regulations2022						
Department	**MATHEMATICS**	**Open Elective for All B.E./B.Tech. Programmes**				
Semester III						
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22MA12305	**Quantitative Aptitude and Problem Solving Skills**	2	1	0	3	**100**
Objectives	To enable the students to: • Enhance the problem solving skills • Improve the basic mathematical skills • Develop their logical reasoning thinking ability • Analysis the problems logically and approach in different manner • Develop the skill of computation with sequences and series					
Outcomes	At the end of the course the students will be able to: • Solveproblemsconcerningnumbersystem,divisibility,factorials,timeandwork • Apply the concepts involving time, speed and distance in real life problems • Solve problems involving investment, profit, loss and interest • Develop analytical skills in trigonometry, partnership and averages • Solve problems related to series, sequence, clocks and direction.					
UNIT-I	**NUMBERS,TIMEANDWORK**					**9**
Numbersystem:Properties-Divisibilityrules–Factorization-ConceptsofHCFandLCM-Factorialbasedproblems,Timeand work: Facts and Formulae, Arithmetic operations using Vedic Mathematics.						
UNIT-II	**PERCENTAGES,TIMEANDDISTANCE**					**9**
Concept of Percentages – Results of Population - Results of Depreciation, Time, Speed and Distance; Units - Relationship between Time and Distance – Applications - Inverse proportionality of Speed and Time.						
UNIT-III	**PROFITANDLOSS**					**9**
Basicconcepts-Costprice-Sellingprice-Markedprice-Gainpercentage-Losspercentage, Simple interest- Compound interest.						
UNIT-IV	**TRIGONOMETRY,PARTNERSHIPSANDAVERAGE**					**9**
Definition–Ratios–Functions-EvenandOddfunctions–Angles-Applications,Partnerships:Definition-Types of Partnership-Ratio of division of gains-Working and Sleeping partners, Average: Facts and Formulae.						
UNIT -V	**SERIESANDSEQUNCENCE**					**9**

Definition - Types - Difference between series and sequence, Clocks: Hour hand – Minute hand – Angle traced by hour – Angle traced by minute, Direction sense: Facing direction – Imaging and Comparing - Cubes; Definition – Properties-Area and Volume.
Total 45Hours
TEXTBOOK:
"Quantitative Aptitude" –R.S.Aggarwal,S.ChandandCompanyLtd,NewDelhi–110055.

REFERENCES:	
1.	A Modern Approach to Verbal and Non-Verbal Reasoning by R.S.Aggarwal, S.Chand and Company Ltd(2012),New Delhi –110055.
2.	Quantitative Aptitude for Competitive Examinations 4th Edition by Abhijit Guha,Tata Mc Graw Hill Publication(2010).

MAHENDRA ENGINEERING COLLEGE (Autonomous)-Syllabus						R 2022
DEPARTMENT:	**SCIENCE & HUMANITIES**	**Programme Code & Name**				**CY& CHEMISTRY**
SEMESTER-III (For Circuit Branches) & SEMESTER- IV (For Non Circuit Branches)						
COURSE CODE	**COURSE NAME**	**HOURS/WEEK**			**CREDIT**	**MAXIMUM MARKS**
22CY11001	**ENVIRONMENTAL SCIENCE AND ENGINEERING**	**L**	**T**	**P**	**C**	**100**
		3	0	0	0	
Objectives	To make the students familiar with : 1. The importance of Ecosystem and Natural resources. 2. The basic concepts of biodiversity and emphasize on the biodiversity of India and its conservation. 3. The causes, effects and prevention measures of environmental Pollution. 4. The influence of societal use of resources on the environment and introduce the legal provisions, National and International laws and conventions for environmental protection. 5. The effect of population dynamics on human and environmental health and inform about human right, value education and role of technology in monitoring human and environmental issues.					
Outcomes	At the end of the course the student will be able to 1. Explain basic knowledge about the importance of environment, ecosystem and Natural resources. 2. Classify the biodiversity and measure the variety of animals, plants and microbial species. 3. Identify the awareness about the different types of Pollution and know about control measures. 4. Organize the environmental impacts related to the society through WHO. 5. Inspect the awareness about population explosion, human welfare and role of information technology in environment.					
UNIT-I	**ENVIRONMENT, ECOSYSTEM AND NATRUAL RESOURCES**					9 Hrs
Definition, scope and importance of environment – Need for public awareness – Concept of an ecosystem – Structure and function of an ecosystem – Energy flow in the ecosystem – Ecological succession – food chains, food webs and ecological pyramids –Natural resources –Types and associated problems (Forest, Water, Food, Mineral and Energy resources).						

UNIT-II	**BIODIVERSITY & CONSERVATION**	9 Hrs
Introduction to biodiversity definition: genetic, species and ecosystem diversity – value of biodiversity – India as amega-diversity nation – hot-spots of biodiversity –threats to biodiversity– endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.		
UNIT-III	**ENVIRONMENTAL POLLUTION**	9 Hrs
Definition – causes, effects and control measures of: (a) Air,(b) Water, (c) Soil, (d) Noise, (e) Thermal pollution– solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies (vizag gas leakage) –disaster management: floods, earthquake and landslides.		
UNIT-IV	**SOCIAL ISSUES AND THE ENVIRONMENT**	9 Hrs
From unsustainable to sustainable development – water conservation strategy – Featureof LARR Act-Rights of a property holder - role of nongovernmental organizations- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies (Global warming). – Wasteland reclamation – consumerism and waste products – environment protection act.		
UNIT-V	**HUMAN POPULATION AND THE ENVIRONMENT**	9 Hrs
Definition – Population growth - variation among nations – population explosion – family welfare program – environment and human health – Human rights – value education – HIV /AIDS – women and child welfare – role of information technology in environment and human health.		
	TOTAL	45 Hrs

Text books :

1.	Gilbert M.Masters, "Introduction to Environmental Engineering and Science", 3nd Edition, Pearson Education, 2014.
2.	Benny Joseph, "Environmental Science and Engineering", Tata McGraw-Hill, New Delhi, 2017.
3.	Dr.A.Ravikrishnan, "Environmental Science and Engineering" , Sri Krishna Hi-tech Publishing Company Pvt. Ltd. Chennai, 2014.

REFERENCES

1.	R.K. Trivedi, "Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards", Vol. I and II, Enviro Media.
2.	Rajagopalan, R, "Environmental Studies-From Crisis to Cure", Oxford University Press (2005)
3.	Dharmendra S. Sengar, "Environmental law", Prentice hall of India PVT LTD, New Delhi, 2007.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	3	3	-	-	2	-	-	-	-	-
CO2	2	-	-	-	-	3	3	-	-	2	-	-	-	-	-
CO3	2	-	-	-	-	3	3	-	-	2	-	-	-	-	-
CO4	2	-	-	-	-	3	3	-	-	2	-	-	-	-	-
CO5	2	-	-	-	-	3	3	-	-	2	-	-	-	-	-
Average	**2**	**-**	**-**	**-**	**-**	**3**	**3**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

FS 68172

Regulations 2022

Batch 2022-2023 - III Semester

Batch 2023-2024 onwards - II Semester

(Common to all B.E./B.Tech. Programmes)

Course code	Course Name	Periods/week			Credit	Maximum marks
		L	T	P	C	
22HS11002	Tamils and Technology	1	0	0	1	100

UNIT-I	**WEAVING AND CERAMIC TECHNOLOGY**	3

Weaving Industry during Sangam Age – Ceramic technology – Black and Red Ware Potteries (BRW) – Graffiti on Potteries.

UNIT-II	**HERITAGE - ROCK ART PAINTINGS TO MODERN ART – SCULPTURE**	3

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age – Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple)- Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

UNIT-III	**MANUFACTURING TECHNOLOGY**	3

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel -Copper and gold-Coins as source of history - Minting of Coins – Beads making-industries Stone beads - Glass beads - Terracotta beads -Shell beads/ bone beats - Archeological evidences - Gem stone types described in Silappathikaram.

UNIT-IV	**AGRICULTURE AND IRRIGATION TECHNOLOGY**	3

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries – Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

UNIT-V	**SCIENTIFIC TAMIL & TAMIL COMPUTING**	3

Development of Scientific Tamil - Tamil computing – Digitalization of Tamil Books – Development of Tamil Software – Tamil Virtual Academy – Tamil Digital Library – Online Tamil Dictionaries – Sorkuvai Project.

TOTAL HOURS	**15**

TEXT BOOK AND REFERENCE BOOKS	
1.	தமிழக வரலாறு – மக்களும் பண்பாடும் – கே.கே. பிள்ளை (வெளியீடு தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்)
2.	கணினித் தமிழ் – முனைவர் இல. சுந்தரம் (விகடன் பிரசுரம்)
3.	கீழடி – வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4.	பொருநை – ஆற்றங்கரை நாகரிகம் (தொல்லியல் துறை வெளியீடு)
5.	Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL – (in print)
6.	Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7.	Historical Heritage of the Tamils (Dr.S.V.Subaramanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8.	The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9.	Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10.	Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Published by: The Author)
11.	Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
12.	Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) – Reference Book.

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code & Name**				**2071**
III Semester						
Course Code	**Course Name**	**Hours /Week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT24301	**DATA STRUCTURES AND ALGORITHMS LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objective(s)	• To understand linear data structure • To Learn non-linear data structure • To understand the different operations of search trees • To learn the fundamental graph traversal algorithms. • To learn the sorting and searching algorithms.					
Outcome(s)	**At the end of the course, the students will be able to:** • Implement the array and linked list for linear data structures. • Apply the non linear data structures to problem solutions. • To create the Heap tree using Priority Queues. • Apply the Graph representation and Traversal algorithms. • To create the 8-Queen's problem using Backtracking method.					

LIST OF EXPERIMENTS		
1	Array implementation of List ADT	
2	Array implementation of Stack and Queue ADTs	
3	Linked list implementation of List	
4	Linked list implementation of Stack and Queue ADTs	
5	Applications of List, Stack and Queue ADTs	
6	Implementation of Binary Trees and operations of Binary Trees	
7	Implementation of Binary Search Trees	
8	To Develop the AVL Trees	
9	Implementation of Heap using Priority Queues.	
10	Graph representation and Traversal algorithms	
11	Implementation of searching and sorting algorithms	
12	Implementation of 8-Queen's problem using Backtracking method.	
	TOTAL HOURS	**30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	3	3	3	3	-	-	2	2	2	2	2	2	2	-
CO2	2	3	3	3	3	-	-	2	2	2	2	2	2	2	-
CO3	2	3	3	3	3	-	-	2	2	2	2	3	3	3	-
Average	**2**	**3**	**3**	**3**	**3**	**-**	**-**	**2**	**2**	**2**	**2**	**2.3**	**2.3**	**2.3**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

III Semester

Course Code	Course Name	Hours/Week			Credit	Maximum marks
		L	T	P	C	
22T24302	PYTHON PROGRAMMING LABORATORY	0	0	3	1.5	100

Objective(s):	The student should be made to: ● Implement Python programs with conditionals and loops. ● Represent compound data using Python lists, tuples, and dictionaries. ● Use functions for structuring Python programs. ● Read and write operations into files. ● Familiarize the concepts of GUI which handles events
Outcome(s):	At the end of the course, the student should be able to: ● Implement Python programs with conditionals and loops. ● Use Python lists, tuples, dictionaries for representing compound data. ● Develop Python programs step-wise by defining functions and calling them. ● Implement programs to read and write operations into files. ● Implement GUI applications.

LISTOF EXPERIMENTS

Use Eucalyptus or Open Nebula or equivalent to set up the cloud and demonstrate	
1	Write a python program to find largest of three numbers.
2	Write a python program to construct pattern using nested for loop.
3	Write a Python program to reverse a string word by word.
4	Demonstrate the list methods.
5	Write a python program to define a module and import a specific function in that module to another program.
6	Perform Read and write operations into file.
7	Programs that take command line arguments (word count).
8	Write a Python program to handle the run time errors while doing file handling operation.
9	Simulate elliptical orbits in Pygame.
10	Design a GUI based calculator to perform arithmetic operations like addition, subtraction, multiplication and division.
	TOTAL HOURS **30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	3	2	3	3	-	-	2	2	2	2	2	2	2	-
CO2	2	3	2	3	3	-	-	2	2	2	2	2	2	2	-
CO3	2	3	3	3	3	-	-	2	2	2	2	3	3	3	-
Average	**2**	**3**	**2.3**	**3**	**3**	**-**	**-**	**2**	**2**	**2**	**2**	**2.3**	**2.3**	**2.3**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

FS 68172

Regulations 2022

IV Semester

Sl. No.	Course code	Course Title	L	T	P	C	Category
	THEORY						
1	22IT14401	Computer Networks	3	0	0	3	PC
2	22IT14402	Database Technology	3	0	0	3	PC
3		Java Programming	3	0	0	3	PC
4		Program Elective-1	3	0	0	3	PE
5	22MA12401	Numerical, Logical and Visual Reasoning Skills(Open Elective-2)	3	0	0	3	OE
6	22SH11006	Universal Human Values	2	1	0	3	MC
	PRACTICAL						
7	22IT24401	Operating Systems(Integrated Courses)	2	0	2	3	PC
8	22IT24402	Database Technology Laboratory	0	0	3	1.5	PC
9	22EN60001 (R)	Professional Communication Skills	0	1	2	2	EEC
		TOTAL	**19**	**02**	**07**	**24.5**	

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
IV Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT14401	**COMPUTER NETWORKS**	3	0	0	3	**100**
Objective(s)	• To understand the protocol layering and physical level communication. • To analyze the performance of a network. • To understand the various components required to build different networks. • To learn the functions of network layer and the various routing protocols. • To familiarize the functions and protocols of the Transport layer.					
Outcome(s)	**On Completion of the course, the students should be able to:** • Explain the basic layers and its functions in computer networks. • Evaluate the performance of a network. • Analyze the basics of how data flows from one node to another. • Analyze and design routing algorithms. • Design protocols for various functions in the network.					
UNIT-I	**INTRODUCTION & PHYSICAL LAYER**					9
Networks – Network Types – Protocol Layering – TCP/IP Protocol suite – OSI Model – Physical Layer: Performance – Transmission media – Switching – Circuit-switched Networks – Packet Switching.						
UNIT-II	**DATA-LINK LAYER & MEDIA ACCESS CONTROL**					9
Introduction – Link-Layer Addressing – DLC Services –Goback N - Sliding Windows-Selective Repeat-Stop& Wait-Data-Link Layer Protocols – HDLC-– PPP - Media Access Control - Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.						
UNIT-III	**NETWORK LAYER**					9
Network Layer Services - Packet Switching - IPV4 Addresses - Forwarding of IP Packets - Network Layer - Protocols: IP, ICMPv4, Mobile IP - Routing Algorithms- Unicast Routing Protocols- Multicast Routing Protocols - Next Generation IP: IPv6 Addressing, IPv6 Protocol.						
UNIT-IV	**TRANSPORT LAYER**					9
Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol - Congestion Control – SCTP.						
UNIT-V	**APPLICATION LAYER**					9
WWW and HTTP – Electronic Mail - Telnet - SSH - DNS - SNMP – DHCP – IMAP – TLS/SSL – IP Security						
					TOTAL HOURS	**45**

TEXT BOOKS:	
1.	Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.
2.	Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
REFERENCES:	
1	James F. Kurose, Keith W. Ross, "Computer Networking: A Top-Down Approach", Seventh Edition, Pearson Education, 2017.
2	William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
3	Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
4	Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
5	James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	2	2	2	3	2	-
CO3	3	2	3	-	-	-	-	-	-	2	2	2	3	2	-
CO4	3	3	3	-	-	-	-	-	-	2	2	2	3	2	-
CO5	2	3	2	-	-	-	-	-	-	2	2	2	3	2	-
Average	**2.4**	**2.6**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1.6**	**1.6**	**2.4**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	ProgrammeCode	2071

IV Semester

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT14402	DATABASE TECHNOLOGY	3	0	0	3	100

Objective(s)	• To learn the fundamentals of data models, conceptualize and depict a database system using ER diagram. • To study the principles to be followed to create an effective relational database and write SQL queries to store/retrieve data to/from database systems. • To know the fundamental concepts of transaction processing, concurrency control techniques and recovery procedure. • To learn about the internal storage structures using different file and indexing techniques and the basics of query processing and optimization. • To study the basics of distributed databases, semi-structured and un-structured data models.
Outcome(s)	Upon completion of this course, students will be able to • Model an application's data requirements using conceptual modeling and design Database schemas based on the conceptual model. • Formulate solutions to a broad range of query problems using relational algebra/SQL. • Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. • Run transactions and estimate the procedures for controlling the consequences of Concurrent data access. • Explain basic database storage structures, access techniques and query processing.

UNIT-I	**RELATIONAL DATABASES**	**9**

Purpose of Database System – Views of Data – Data Models – Database System Architecture – Introduction to Relational Databases – Relational Model – Keys – Relational Algebra – Relational Calculus – SQL Fundamentals – Advanced SQL features – Triggers –Embedded SQL.

UNIT-II	**DATABASE DESIGN**	**9**

Entity-Relationship Model – ER Diagrams – Functional Dependencies – Non-Loss Decomposition Functional Dependencies – First Normal Form – Second Normal Form –Third Normal Form – Dependency Preservation – Boyce/Codd Normal Form – Multi-Valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

UNIT-III	**TRANSACTION MANAGEMENT**	**9**

Transaction Concepts – ACID Properties – Serializability – Transaction Isolation Levels – Concurrency Control – Need for Concurrency – Lock-Based Protocols – Deadlock Handling – Recovery System – Failure Classification – Recovery Algorithm.		
UNIT-IV	**IMPLEMENTATION TECHNIQUES**	**9**
Overview of Physical Storage Media – RAID – File Organization – Organization of Recordsin Files – Indexing and Hashing – Ordered Indices – B+ tree Index Files – Static Hashing –Dynamic Hashing – Query Processing Overview – Catalog Information for Cost Estimation –Query Optimization.		
UNIT-V	**ADVANCED TOPICS**	**9**
Overview of Distributed Databases – Data Fragmentation – Replication – XML Databases – XML Schema – NOSQL Database: Characteristics – CAP theorem – Types of No SQLData stores: Column Oriented, Document, Key-Value and Graph Types – Applications –Current Trends.		
	TOTAL HOURS	**45**

TEXT BOOKS :	
1	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, "Database System Concepts", Sixth Edition, Tata McGraw Hill, 2014.
2	RamezElmasri, Shamkant B. Navathe, "Fundamentals of Database Systems", Seventh Edition, Pearson Education, 2017.
REFERENCES:	
1	C. J. Date, A. Kannan, S. Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education, 2006.
2	Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", Fourth Edition, Tata McGraw Hill, 2010.
3	G. K. Gupta, "Database Management Systems", Tata McGraw Hill, 2011.
4	Carlos Coronel, Steven Morris, Peter Rob, "Database Systems: Design, Implementation and Management", Ninth Edition, Cengage Learning, 2011.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	1	-
CO2	3	3	3	-	-	-	-	-	-	2	2	2	2	2	-
CO3	3	-	-	-	-	-	-	-	-	2	-	-	1	-	-
CO4	2	2	3	-	-	-	-	-	-	2	2	2	2	2	-
CO5	2	2	2	-	-	-	-	-	-	2	1	1	-	-	-
Average	**2.4**	**1.4**	**1.6**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**1**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Computer Science and Engineering	Programme Code	1031

IV Semester

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
	JAVA PROGRAMMING	3	0	0	3	100

Objective(s)	The student should be made to: ● Implementing program for user interface and application development using core java principles ● Comprehension of java programming constructs, control structures in java ● Implementing object oriented constructs such as various class hierarchies, interfaces and exception handling ● Understanding of thread concepts and I/O in java ● Being able to build basic network programs in java
Outcome(s)	● Explain the basics of OOP concepts using Java ● Outline the syntax of programming constructs using Java ● Explain the role of interface and exceptions in Java ● Apply the concepts of multithreading using Java ● Analyze the basics of concurrent and network programming concepts

UNIT-I	**INTRODUCTION TO OOPS**	**9**
Introduction - need of object oriented programming - principles of object oriented languages - procedural languages Vs. OOPs - applications of OOPs - history of JAVA - java virtual machine java features - program structures - installation of JDK1.6		
UNIT-II	**PROGRAMMING CONSTRUCTS**	**9**
Variables - primitive data types – identifiers - naming conventions – keywords – literals – operators – binary - unary and ternary – expression - precedence rules and associativity - primitive type conversion and casting - flow of control – arrays- command line arguments.		
UNIT-III	**INTERFACE AND EXCEPTIONS**	**9**
Types of inheritance – interface - interface vs abstract classes - packages-creating packages - access protection -java.lang package - exception handling techniques - user defined exception - exception encapsulation – enrichment – assertions		
UNIT-IV	**MULTITHREADING**	**9**
The main thread - creation of new threads - thread priority – multithreading - using is Alive () and join () – Synchronization - suspending and resuming threads - communication between threads - reading and writing data.		

UNIT-V	CONCURRENT AND NETWORK PROGRAMMING	9
Threads – Thread states – Interrupting threads – Thread communication - Networking basics – Java and the Net - InetAddress –- TCP/IP Server Sockets – Remote Method Invocation – A simple client/server application using RMI.		
	Total hours to be taught	**L:45**

LIST OF EXPERIMENTS	
1	Complex number manipulation
2	Develop a program using Date class
3	Implement dynamic polymorphism in Java
4	Java interface for ADT stack
5	Develop a simple paint program using applet
6	Design a scientific calculator
7	Generate prime numbers and Fibonacci series
8	Multithreaded GUI application
	Total hours to be taught **P:15**

TEXT BOOK :	
1	Herbert Schildt, “Java The Complete Reference”, TMH, 2014.
REFERENCES:	
1	ElliotteRustry Harold, “Java Network Programming”, O’Reilly, 2014.
2	Peter Haggar, “Practical Java Programming Language Guide”, Addison Wesley, 2000.
3	Daniel Liang Y, “An Introduction to Java Programming”, PHI pvt ltd, 2003.
4	Coursera, Java Programming: Solving Problems with Software, https://www.coursera.org/learn/java-programming

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	1	2	2	-	-	-	-	2	-	2	-	-	-
CO2	2	3	2	2	2	-	-	-	-	2	2	2	3	2	-
CO3	3	2	1	2	2	-	-	-	-	2	2	2	3	2	-
CO4	3	3	1	2	2	-	-	-	-	2	2	2	3	2	-
CO5	2	3	1	2	2	-	-	-	-	2	2	2	3	2	-
Average	**2.4**	**2.6**	**1**	**2**	**2**	**-**	**-**	**-**	**-**	**2**	**1.6**	**1**	**2.4**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRAENGINEERINGCOLLEGE(Autonomous)							
Regulations2022							
Department:	**MATHEMATICS**	**Open Elective for All B.E./B.Tech. Programmes**					
IVSEMESTER							
Course Code	**COURSE NAME**	**Hours/Week**			**Credit**	**Maximum Marks**	
22MA12401	**Numerical, Logical and Visual Reasoning Skills**	**L**	**T**	**P**	**C**	**100**	
		2	1	0	3		
Objectives	To enable the students to: • Improve the thinking process along with the analytical skills • Enhance the numerical and problem solving abilities • Develop the skill of solving puzzles. • Understand and practice Logical reasoning skills • Develop their basic skills of verbal aptitude						
Outcomes	At the end of the course the students will be able to: • Calculate the number of ways in which a given number of objects can be arranged and probability of random events. • Recognize and apply ratios and proportions to solve real-life problems • Apply Geometry and Quadratic equations, analyse data and Blood relations. • Determine the meanings of new words through the use of analogies. • Develop analytical and visual reasoning skills.						
UNIT-I	**PERMUTATIONANDCOMBINATION**						9
Permutation-Numberofpermutationsandcorollary–combinations-Numberofcombinations–Probability-Random Experiments-Sample Space -Result on probability.							
UNIT-II	**RATIOAND PROPORTION**						9
Ratio-comparisonofratio-Compoundedratio-Duplicate-Subduplicateratio–Proportion-MeanProportionand variation–Logarithms-Property of Logarithms-Progressions.							
UNIT-III	**GEOMETRY,BLOODRELATIONS**						9
Geometry - definition - Direction ratio of the line joining two points - Distance of a point from a plane – Quadratic Equations - Real life applications - Calculating Area - Linear and circular arrangements – tabular arrangements-Types of the Blood relation –Difference between relation and relatives.							
UNIT-IV	**CODINGANDDECODING**						9
ObserveAlphabets-TofindthePatternorSequence-FindthesequenceitfollowswhetheritisAscendingor Descending-Number Series -Number Analogy.							

UNIT-V	ODDMANOUT, VISUAL REASONING	9
Oddmenout-Imageandfigurecounting-CubeandDice-Venndiagram-DirectionandDistance-Solvingpicturereasoning-Visual memory reasoning.		
	Total	**45Hours**

TEXTBOOK:	
1.	"Quantitative Aptitude" –R.S.Aggarwal, S.Chandand Company Ltd,NewDelhi–110055.

REFERENCES:	
1.	AModernApproachtoVerbalandNon-VerbalReasoningbyR.S.Aggarwal,S.Chandand Company Ltd.(2012),NewDelhi–110055.
2.	QuantitativeAptitudeforCompetitiveExaminations,4thEditionbyAbhijitGuha,TataMcGraw Hill Publication (2010).

Course Code	Course Name	Hours/Week			Credit	Maximum Marks
		L	T	P	C	
22SH11006	UNIVERSAL HUMAN VALUES	2	1	0	3	100

(Mandatory Credit Course to All UG Programmes to be offered in III / IV Semester)

Pre-requisites: Universal Human Values 1 (Induction Programme) (desirable)

The foundation course "H-102 Universal Human Values: "Understanding Harmony" may be covered in III or IV semester. This course discusses the role of human beings in their family. It also touches issues related to their role in the society and the nature. During the Induction Program, students would get an initial exposure to human values through Universal Human Values 1. This exposure is to be augmented by this compulsory full semester foundation course. The Course has 5 Modules (5 Units): 30 Lectures and 15 Practice sessions(Tutorials).

1. COURSEOBJECTIVES:

The objectives of the course are:

(i). Developmentofaholisticperspectivebasedonself-explorationaboutthemselves(humanbeing), family, society and nature/existence.

(ii). Understanding(or developing clarity)the harmony in the human being, family, society and nature/existence

(iii). Strengthening of self-reflection for harmonious relationship in family, society

(iv). Development of commitment and courage to act as human being in ensuring harmony in nature for co-existence.

(v). Developmentofholisticprinciplesofharmonyandprofessionalethicsfornaturalacceptanceofhuman values and observe ethical humanconduct.

2. COURSEOUTCOMES:

Upon completion of the Course the Learner will be able to:

- Distinguish between values and skills, and highlight the need for Universal Human Values.
- Describe the need for Harmony and distinguish between happiness and accumulation of physical facilities, etc.
- Relate the value of harmonious relationship in family, society based on trust and respect for happiness and prosperity in their life and profession.
- Outline the role of a human being in ensuring harmony in nature forco-existence.
- Apply the holistic principles of Harmony and Professional Ethics for natural acceptance of human values and observe Ethical Human Conduct.

Module 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

L 1. Purpose and motivation for the course, recapitulation from Universal Human Values-I (Induction Programme).

L 2. Self-Exploration–what is it? Its content and process; 'Natural Acceptance' and Experiential

Validation-as the process for self-exploration.

L 3. Continuous Happiness and Prosperity - A look at basic Human Aspirations.

L 4. Right understanding, Relationship and Physical Facility - the basic requirements for fulfillment of aspirations of every human being with their correct priority.

L 5. Understanding Happiness and Prosperity correctly - A critical appraisal of the current scenario.

L 6. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

3 Practice sessions *(T1 to T3) - To discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.*

Module 2: Understanding Harmony in the Human Being - Harmony in Myself!

L 7. Understanding human being as a co-existence of the sentient 'I' and the material 'Body' L

8. Understanding the needs of Self ('I') and 'Body'- happiness and physical facility

L 9. Understanding the Body as an instrument of 'I'(I being the doer, seer and enjoyer) L

10.Understanding the characteristics and activities of 'I' and harmony in 'I'

L 11.Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail.

L 12.Programs to ensure Sanyam and Health.

3 Practice sessions *(T4 to T6) - To discuss the role others have played in making material goods available tome.Identifyingfromone'sownlife.Differentiatebetweenprosperityandaccumulation.Discussprogram for ensuring health vs dealing with disease.*

Module 3: Understanding Harmony in the Family and Society - Harmony in Human-Human Relationship

L 13. Understanding values in human-human relationship; meaning of Justice (Nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship.

L 14. Understanding the meaning of Trust; Difference between intention and competence.

L 15. Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship.

L 16. Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals.

L 17. Visualizing a universal harmonious order in Society-Undivided Society, Universal Order-from family to world family.

3 Practice sessions *(T7 to T9): Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education, etc. Discuss Gratitude as a universal value in relationships, scenarios. Elicit examples from students' lives.*

Module4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

L 18. Understanding the harmony in the Nature.

L 19. Interconnectedness and mutual fulfillment among the four orders of nature - recyclability and self-regulation in nature.
L 20. Understanding Existence as Co-existence of mutually interacting units in all - pervasive space. L
21. Holistic perception of harmony at all levels of existence.
2 Practice sessions *(T10 to T11): Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology, etc.*

Module 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics
L 22. Natural acceptance of human values.
L 23. Definitiveness of Ethical Human Conduct.
L 24. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order.
L 25. Competence in professional ethics: (a). Ability to utilize the professional competence for augmenting universal human order (b). Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, (c). Ability to identify and develop appropriate technologies and management patterns for above production systems.
L 26. Case studies of typical holistic technologies, management models and production systems.
L 27. Strategy for transition from the present state to Universal Human Order: (a). At the level of individual: as socially and ecologically responsible engineers, technologists and managers (b). At the level of society: as mutually enriching institutions and organizations.
L 28. Definition of Morals, Values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully.
L 29. Importance of Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self-confidence – Character – Spirituality.
L 30. Introduction to Yoga and meditation for professional excellence and stress management.
Sum up.
4 Practice sessions *(T12 to T15) - Include Practice Exercises and Case Studies which will be taken up in Practice (Tutorial) Sessions.*
eg. To discuss the conduct as an Engineer or Scientist, etc.

TOTAL = 45 Hours

3. READINGS:

3.1 Textbook

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010.

3.2 ReferenceBooks

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak,1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi,2004.
3. The Story of My Experiments with Truth -by Mohandas KaramchandGandhi
4. Small is Beautiful - E. FSchumacher.
5. Slow is Beautiful - CecileAndrews.

6. Economy of Permanence - J CKumarappa.
7. Bharat Mein Angreji Raj - PanditSunderlal.
8. Rediscovering India byDharampal.
9. Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi.
10. India Wins Freedom - Maulana Abdul Kalam Azad.
11. Vivekananda - Romain Rolland(English).
12. MikaMartinandRolandScinger,'EthicsinEngineering',PearsonEducation/PrenticeHall,NewYork 1996.

Member

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COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	-	-	-	-	-	-	-	3	-	-	-	2	-	-	-
CO2	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	3	-	-	-	1	-	-	-
CO4	-	-	-	-	-	1	-	2	-	-	-	2	-	-	-
CO5	-	-	-	-	-	2	-	2	-	-	-	2	-	-	-
Average	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**2.4**	**-**	**-**	**-**	**1.8**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	**Information Technology**	**Programme Code**	**2071**

IV Semester

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT24401	**OPERATING SYSTEMS (Integrated Course)**	2	0	2	3	**100**

Objective(s)	**Theory:** • To learn the fundamentals of Processes and Threads • To analyze various scheduling and memory management schemes. **Laboratory:** • To learn Unix commands and shel lprogramming • To implement various CPU Scheduling Algorithms • Knowledge about advanced concepts in OS • Ability to develop OS for distributed systems
Outcome(s)	**At the end of the course, the students should be able to:** **Theory:** • Analyze various Processes and Threads , scheduling algorithms. • Compare and contrast memory and storage management schemes. **Laboratory**: • Compare the performance of various CPU Scheduling Algorithms • Implement Deadlock avoidance and Detection Algorithms • Analyze the performance of the various Page Replacement Algorithms

UNIT-I	**FUNDAMENTALS OF OPERATING SYSTEMS & Scheduling**	7

Overview –System calls- Processes and Threads –Process scheduling -CPU Scheduling. Interprocess Communication. Deadlocks: Detection, Prevention and Recovery – Models of Resources – Memory Management Techniques. Message Passing.

UNIT-II	**SYNCHRONIZATION AND MEMORY MANAGEMENT**	8

The critical-section problem, Synchronization hardware, Mutex locks, Semaphores, Classic problems of synchronization, Critical regions; Main Memory- Swapping, Contiguous Memory Allocation, Paging, Segmentation, Segmentation with paging,Virtual Memory- Page Replacement, -Allocating Kernel Memory.Disk Scheduling.

LISTOF EXPERIMENTS

1. Study of hardware and software requirements of different Operating Systems.(UNIX,LINUX,WINDOWS)
2. Basic Unix file system commands such as ls, cd, mkdir, rmdir, cp, rm, mv, more, lpr, man, grep, sed, etc.
3. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir.
4. Implement the various CPU Scheduling Algorithms

a)FCFS b)SJS

5. Implement the various CPU Scheduling Algorithms
   a) Priority Scheduling b)Round Robin Scheduling
6. Bankers Algorithm for Deadlock Avoidance
7. Implementation of Deadlock Detection Algorithm
8. Implement the Producer-Consumer Problem in Semaphore.
9. Write C program to implement Threading Applications.
10. Implementation of the following Memory Allocation Methods for fixed partition
    a)First Fit b) Worst Fit c) Best Fit
11. Implementation of the following Page Replacement Algorithms
    a)FIFO b) LRU c) LFU

TOTAL HOURS	**45**

TEXT BOOKS:	
1	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, -Operating System Concepts, 9th Edition, John Wiley and Sons Inc., 2012.
REFERENCES:	
1	RamazElmasri, A. Gil Carrick, David Levine, —Operating Systems – A Spiral Approach, Tata McGraw Hill Edition, 2010.
2	AchyutS.Godbole, AtulKahate, —Operating Systems, Mc Graw Hill Education, 2016.
3	Andrew S. Tanenbaum, —Modern Operating Systems, Second Edition, Pearson Education, 2004.
4	Gary Nutt, —Operating Systems, Third Edition, Pearson Education, 2004.
5	Harvey M. Deitel, —Operating Systems, Third Edition, Pearson Education, 2004.
6	Daniel P Bovet and Marco Cesati, —Understanding the Linux kernel, 3rd edition, O'Reilly, 2005.
7	Neil Smyth, —iPhone iOS 4 Development Essentials – Xcode, Fourth Edition, Payload media, 2011.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	3	2	2	-	-	-	2	2	1	-	-	-	-
CO2	3	-	-	2	3	-	-	-	2	2	-	-	2	2	-
CO3	2	2	3	2	2	-	-	-	2	2	2	-	2	2	-
CO4	3	-	-	2	2	-	-	-	2	2	-	-	-	-	-
CO5	1	2	3	2	2	-	-	-	2	2	2	0	2	2	-
Average	**2.2**	**1.2**	**1.8**	**2**	**2.2**	**-**	**-**	**-**	**2**	**2**	**1**	**-**	**1.2**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus						
Department	**Information Technology**		**Programme Code & Name**			**2071**
IV Semester						
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT24402	**DATABASE TECHNOLOGY LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objective(s)	• To learn and implement important commands in SQL. • To learn the usage of nested and joint queries. • To understand functions, procedures and procedural extensions of databases. • To understand design and implementation of typical database applications. • To be familiar with the use of a front end tool for GUI based application development.					
Outcome(s)	• Write simple and complex SQL queries using DML and DCL commands. • Realize database design using 3NF and BCNF. • Use advanced features such as stored procedures and triggers and incorporate in GUI based application development.					

LISTOF EXPERIMENTS

1.	Create a database table, add constraints (primary key, unique, check, Not null), insert rows, update and delete rows using SQL DDL and DML commands.
2.	Create set of tables, add foreign key constraints and incorporate referential integrity.
3.	Query the database tables using different ‘where’ clause conditions and also Implement aggregate functions.
4.	Query the database tables and explore sub queries and simple join operations.
5.	Query the database tables and explore natural, equi and outer joins.
6.	Write user defined functions and stored procedures in SQL.
7.	Execute complex transactions and realize DCL and TCL commands.
8.	Write SQL Triggers for insert, delete, and update operations in database table.
9.	Create View and index for database tables with large number of records.
10.	Create a XML database and validate it using XML schema.
11.	Create Document, column and graph based data using NOSQL database tools.
12.	Develop a simple GUI based database application and incorporate all the above-Mentioned features.
TOTAL HOURS	**30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	3	3	3	3	-	-	-	2	2	2	2	2	-	-
CO2	3	2	2	2	2	-	-	-	2	2	2	2	1	1	-
CO3	3	3	3	3	3	-	-	-	2	2	2	2	-	2	-
Average	**3**	**2.6**	**2.6**	**2.6**	**2.6**	**1**	**-**	**-**	**2**	**2**	**2**	**2**	**1**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus - Regulation 2022

Department	**English**

Semester – IV
(Common to all B.E./B.Tech. Programmes)

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22EN60001(R)	**PROFESSIONAL COMMUNICATION SKILLS** (Common to all B.E./B.Tech. Degree Programmes)	0	1	2	2	**100**

Objectives	➢ To familiarize students with the stage dynamics ➢ To help the learners to improve their creative skills ➢ To make them acquire the ability to speak effectively in real life situations
Outcomes	**At the end of the course, the learners will be able to :** ➢ Apply suitable vocabulary in academic and workplace contexts ➢ Demonstrate communication skills effectively in both oral and written formats ➢ Create documents professionally and make presentations effectively

LIST OF EXERCISES

1.	Introduction to Professional Communication and SWOT Analysis
2.	Reading Comprehension
3.	Listening Comprehension
4.	Stage Dynamics (Body Language and Paralanguage - Presentation)
5.	Framing Questions (WH Questions & 'Yes' or 'No' Questions)
6.	Narrative Techniques (Structure, Grammar & Vocabulary- Narrating the Experience)
7.	Master of Ceremony Skills (Practice)
8.	Picture Description
9.	Creative Writing
10.	Extempore Speech

Total Hrs : 30

Textbook:	
1	Joshi, Manmohan, *Soft Skills*, 1st Edition. Bookboon, 2017
References:	
1	Muralikrishna, & Sunita Mishra, *Communication Skills for Engineers*. Pearson, New Delhi, 2011.
2	Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, New Delhi, 2011
Online Websites:	
1	https:// www.ted.com/talks
2	https://joshtalks.com
3	https://quizziz.com
4	www.pdfdrive.com
5	www.talking books.com

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	-	-	-	-	-	-	-	2	3	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	2	3	3	-	2	-	-	-
CO3	-	-	-	-	-	-	-	2	3	3	-	2	-	-	-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**3**	**2.6**	**-**	**2**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

FS 68172

	Regulations 2022						
	V Semester						
Sl. No.	**Course code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**
	THEORY						
1	22IT14501	Computer Graphics and Multimedia	3	0	0	3	PC
2	22IT14502	Web Technology	3	0	0	3	PC
3	22IT34503	Object Oriented Software Engineering(Integrated Course)	2	0	2	3	PC
4		Program Elective-2	3	0	0	3	PE
5		Open Elective-3	3	0	0	3	OE
6		Open Elective-4	3	0	0	3	OE
7	22IT14503	Constitution of India	3	0	0	-	MC
	PRACTICAL						
8	22IT24501	Multimedia Laboratory	0	0	3	1.5	PC
8	22IT24502	Web Technology Laboratory	0	0	3	1.5	PC
9	22EN60002	Interview Skills and Soft Skills	0	1	2	2	EEC
		TOTAL	**20**	**01**	**10**	**23**	

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
V Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT14501	**COMPUTER GRAPHICS AND MULTIMEDIA**	3	0	0	3	**100**
Objective(s)	The student should be made to: • Understand the types of color models and algorithms. • Be familiar with the concept of two-dimensional and their transformations. • Gain knowledge about different3D techniques used in graphics. • Learn the types available in multimedia file format. • Have a knowledge about non sequential access of text documents in hyper media					
Outcome(s)	Upon completion of this course , students will be able to • Explain the basic concept of Output primitives. • Apply transformation techniques to two dimensional graphics. • Differentiate two dimensional and three dimensional transformation techniques. • Elaborate Different types of Multimedia File Format. • Summarize the concepts of Multimedia Authoring and User Interface.					
UNIT-I	**INTRODUCTION AND COLOUR MODELS**					**9**
Overview of graphics systems – Video display devices, Raster scan systems, Random scan systems, Graphics monitors and Workstations, Input devices, Hard copy Devices, Graphics Software; Output primitives – points and lines, line drawing algorithms; circle and ellipse generating algorithms; Line attribute curve attributes Intuitive color concepts - RGB color model - YIQ color model - CMY color model - HSV color model - HLS color model. Pixel addressing and object geometry, filled area primitives.						
UNIT-II	**TWO DIMENSIONAL GRAPHICS**					**9**
Two dimensional geometric transformations – Matrix representations and homogeneous coordinates, composite transformations; Two dimensional viewing – viewing pipeline, viewing coordinate reference frame; window-to-viewport coordinate transformation, Two dimensional viewing functions; clipping operations – point, line, polygon, Curve ,Text and Exterior clipping algorithms						
UNIT-III	**THREE DIMENSIONAL GRAPHICS**					**9**
Three dimensional object representations – Polygon surfaces- Polygon tables- Plane equations - Polygon meshes; Curved Lines and surfaces, Quadratic surfaces; Spline representations – Bezier curves and surfaces -B-Spline curves and surfaces- 3D Geometric Transformations –3DViewing.						
UNIT-IV	**MULTIMEDIA SYSTEM DESIGN & MULTIMEDIA FILE HANDLING**					**9**
Introduction to Multimedia: Introduction – Uses of Multimedia – Interaction Technologies and Devices – Text – Digital Images Multimedia basics − Multimedia applications − Multimedia						

system architecture − Evolving technologies for multimedia − Defining objects for multimedia systems − Multimedia data interface standards − Multimedia databases. Compression and decompression − Data and file format standards − Multimedia I/O technologies − Digital voice and audio − Video image and animation − Full motion video − Storage and retrieval technologies. Creating Animation in Flash – Designing Multimedia		
UNIT-V	**HYPERMEDIA**	**9**
Multimedia Authoring and User Interface − Hypermedia Messaging − Mobile Messaging − Hypermedia Message Component − Creating Hypermedia Message − Integrated Multimedia Message Standards − Integrated Document Management − Distributed Multimedia Systems. CASE STUDY: BLENDER GRAPHICS Blender Fundamentals – Drawing Basic Shapes – Modeling – Shading & Textures		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Donald Hearn and M. Pauline Baker, "Computer Graphics C Version", Pearson Education, 2012.
2	Andleigh, P. K and Kiran Thakrar, "Multimedia Systems and Design", PHI, 2005.
REFERENCES:	
1	Judith Jeffcoate, "Multimedia in practice: Technology and Applications", PHI, 2013
2	Foley, Vandam, Feiner and Huges, "Computer Graphics: Principles and Practice", 2nd Edition, Pearson Education, 2006.
3	Peter Shirley, Michael Ashikhmin, Michael Gleicher, Stephen R Marschner, Erik Reinhard, KelvinSung, and AK Peters, —Fundamentals of Computer Graphics, CRC Press, 2010.
4	Jeffrey McConnel, —Computer Graphics: Theory into Practice, Jones and Bartlett Publishers,2006.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	1	-	1	1	1	-
CO2	2	2	3	-	-	-	-	-	-	1	-	2	3	2	-
CO3	2	2	3	-	-	-	-	-	-	1	-	1	3	2	-
CO4	2	1	-	-	-	-	-	-	-	1	-	1	2	1	-
CO5	2	-	-	-	-	-	-	-	-	1	-	2	2	2	-
Average	**2**	**1**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1.4**	**2.2**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
V Semester							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT14502	**WEB TECHNOLOGY**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To study about basics of User Interface design. • To be familiar with web page design using XML/HTML and style sheets. • To learn and create dynamic web pages using server side scripting Languages. • To understand the basis of Angular JS Framework • To learn Client side and Server Side Angular JS framework.						
Outcome(s)	**Upon completion of this course , students will be able to** • Design static web pages using HTML, CSS and Bootstrap. • Develop interactive and dynamic web pages using javascript • Develop a web application using node JS with database connectivity • Apply the features of Typescript and Angular to develop web applications • Apply client side JS framework to develop web applications						
UNIT-I	**UI DESIGN**						**9**
HTML5: Introduction – Basic tags – HTML Forms Element – Page Structured Elements – Media Tags. Cascading Style Sheet: Types of CSS – Positioning Elements – Backgrounds – Box Model – Dropdown Menus. Responsive Web Design: Introduction – Bootstrap – Grid basics – Nav – Nav Bar – List – Drop down – Tables – Button –Images – Forms–Input – Input Groups.							
UNIT-II	**JAVASCRIPT**						**9**
JavaScript: Introduction – Operators, Control Structures: Selection: if – if-else – switch. Repetition: while – do-while – for – break and continue. Functions: Function Definition – Scope Rules – Recursion. Array: Declaration – Initialization – Growing Arrays – Passing Arrays to Function. Event Handling.							
UNIT-III	**SERVER-SIDE JS FRAMEWORK**						**9**
Node JS Introduction – Architecture – Features – Creating Web Servers with HTTP -Request – Response – Event Handling – GET and POST Methods – Modules – Connect to No SQL Database using Node JS – Implementation of CRUD operations.							

UNIT-IV	TYPESCRIPT AND ANGULAR 6.0	9
Type Script: Introduction – Features – Variables – Data types – Enum – Array – Tuples – Functions – OOP concepts – Interfaces – Classes – Modules – Decorators. Angular 6.0 : Introduction – Needs – Features – Evolution – Setup and Configuration – Components and Modules – Templates – Change Detection – Directives – Nested Components.– Data Binding – Pipe		
UNIT-V	**CLIENT-SIDE JS FRAMEWORK**	**9**
Services – HTTP – Routing – Forms in Angular – Template Driven Forms – Model Driven Forms - Reactive Forms – Custom Validators – Dependency Injection.		
	TOTAL HOURS	**45**

TEXT BOOKS :	
1	Paul Deitel, Harvey M. Deitel & Abbey Deitel, "Internet and World Wide Web - How To Program", 5th Edition, Prentice Hall, 2011. I[first half], II
2	Infosys campus connect material shared by infy. I[Second Half] III,IV,V.
REFERENCES:	
1	Robert W. Sebesta, “Programming with World Wide Web”, Fourth Edition, Pearson, 2008.
2	David William Barron, “The World of Scripting Languages”, Wiley Publications, 2000.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	1	-	1	1	3	-
CO2	2	3	3	-	-	-	-	-	-	1	-	2	3	2	-
CO3	2	2	3	-	-	-	-	-	-	1	-	1	2	2	-
CO4	2	2	3	-	-	-	-	-	-	1	-	1	2	2	-
CO5	2	2	3	-	-	-	-	-	-	1	-	-	3	2	-
Average	**2**	**1.8**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**1**	**2.2**	**2.2**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
V Semester							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT34503	**OBJECT ORIENTED SOFTWARE ENGINEERING (Integrated Course)**	**L**	**T**	**P**	**C**	**100**	
		2	0	2	3		
Objective(s)	**The student should be made to:** • Understand the Software Engineering Lifecycle Models • Perform the software requirements analysis • Learn the knowledge of the System Analysis and Design concepts using UML.						
Outcome(s)	**Upon completion of this course , students will be able to** • Compare various Software Development Lifecycle Models • Evaluate project management approaches as well as cost and schedule estimation strategies. • Perform formal analysis on specifications.						
UNIT-I	**SOFTWARE PROCESS AND AGILE DEVELOPMENT**					**9**	
Introduction to Software Engineering, Software Process, Perspective and Specialized Process Models –Introduction to Agility-Agile process-Extreme programming-XP Process-Case Study.							
UNIT-II	**REQUIREMENTS ANALYSIS AND SPECIFICATION**					**9**	
Requirement analysis and specification – Requirements gathering and analysis – Software Requirement Specification – Formal system specification – Finite State Machines – Petrinets – Object modelling using UML – Use case Model – Class diagrams – Interaction diagrams – Activity diagrams – State chart diagrams – Functional modelling – Data Flow Diagram- CASE TOOLS.							
UNIT-III	**SOFTWARE DESIGN**					9	
Software design – Design process – Design concepts – Coupling – Cohesion – Functional independence – Design patterns – Model-view-controller – Publish-subscribe – Adapter – Command – Strategy – Observer – Proxy – Facade – Architectural styles – Layered - Client Server - Tiered - Pipe and filter- User interface design-Case Study.							
LISTOF EXPERIMENTS							
	To develop a mini-project by following the 6exercises listed below. 1. To develop a problem statement. 2. Identify Use Cases and develop the Use Case model. 3. Identify the conceptual classes and develop a domain model with UML Class diagram. 4. Using the identified scenarios find the interaction between objects and represent them using UML Sequence diagrams. 5. Draw relevant state charts and activity diagrams. 6. Identify the User Interface, Domain objects, and Technical services. Draw the partial						

	layered, logical architecture diagram with UML package diagram notation.	
	Suggested domains for Mini-Project: • Passport automation system. • Book bank • Exam Registration • Stock maintenance system. • Online course reservation system • E-ticketing • Student information System • Library Management System • Conference management system	
	TOTAL HOURS	**45**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	-	-	2	1	-	3	2	-
CO2	3	-	-	-	-	-	-	-	-	2	1	-	1	1	-
CO3	2	2	3	-	-	-	-	-	-	2	2	-	3	2	-
CO4	2	2	3	-	-	-	-	-	-	2	2	-	3	2	-
CO5	3	3	3	3	-	-	-	-	-	3	2	-	3	3	-
Average	**2.6**	**1.4**	**1.8**	**-**	**-**	**-**	**-**	**-**	**-**	**2.2**	**1.6**	**-**	**2.6**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Regulations 2022						
Department	**MATHEMATICS**	**Open Elective for All B.E./B.Tech. Programmes**				
V Semester						
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22MA12501	**Interpretation, Analysis and Critical Thinking Skills(Open Elective-3)**	2	1	0	3	**100**
Objectives	The students should be made do : • To develop the students logical thinking skills and apply it in the real life scenarios. • To learn the strategies of solving Quantitative ability problems. • To enrich the verbal ability of the students. • To strengthen the basic programming skills of placements • Develop the skill of computation with sequences and series					
Outcomes	At the end of the course the students will be able to: • Identify the techniques to solve Image interpretation and Relationship. • Use Techniques to solve Logical Reasoning questions • Interpret data, manipulate and summarize the information in order to answer Critical questions. • Identify the core skills associated with Critical Thinking. • Apply the basic concepts to solve problems on Surds, Pipes, Cisterns, Permutation and Combination.					
UNIT-I	**VERBAL ABILITY**					**9**
Attention to details – Verbal Reasoning test – Types of image interpretation – Relationship – Classification - Solved Problems.						
UNIT-II	**LOGICAL REASONING**					**9**
Sentence Completion and Para Jumbles – Logical connectives - Types of Logical Relationship – Types of Syllogism – Logical Deductions using Venn diagram.						
UNIT-III	**DATA INTERPRETATION AND DATA SUFFICIENCY**					**9**
Ages – Problems on Ages – Concepts and basics – Set Theory– Set Operation – types ofsets – solved problems – Calendars – Odd days – Leap year – counting of odd days, finding exact date – Data interpretation – Tabulation – Bar graphs – Pie charts – Line graphs – Data sufficiency based on problems.						
UNIT-IV	**CRITICAL REASONING**					**9**
Surface area – Cuboids – Cube – Cylinder – Cone – Sphere – Hemisphere – Alligation – Mean Price – Rule of Alligation - Boats and Streams - Speed in Down Stream and upstream - Stream in still water - Rate of Stream - Critical Reasoning – Solved Problems.						
UNIT -V	**ARITHMETICAL ABILITY**					**9**

Indices and Surds – Law's of Indices - Law's of Surds - Pipes and Cisterns – Problems based on In- let and Out-let, Part of tank filled, Time based problems - Permutation and Combination – Factorial – Number of Permutation – Number of Combination – Solved Problems.	
TOTAL	**45 Hours**

TEXT BOOK :	
1."Quantitative Aptitude" – R.S. Aggarwal, S.Chand and Company Ltd, New Delhi – 110055.	
2. A Modern Approach to Verbal and Non-Verbal Reasoning by R.S.Aggarwal, S.Chand and Company Ltd (2012), New Delhi – 110055.	
REFERENCES:	
1.	Test of Reasoning for Competitive Examinations, 4th Edition by Edgar Thorpe, Tata McGraw Hill Publication, 2010.
2.	Quantitative Aptitude for Competitive Examinations 4th Edition by Abhijit Guha, Tata McGraw Hill Publication (2010).

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	2	-	-	2	-	-	2	-	-	-
CO2	3	-	-	-	-	2	-	-	2	-	-	2	-	-	-
CO3	3	-	-	-	-	2	-	-	2	-	-	2	-	-	-
CO4	3	-	-	-	-	2	-	-	2	-	-	2	-	-	-
CO5	3	-	-	-	-	2	-	-	2	-	-	2	-	-	-
Average	**3**	-	-	-	-	**2**	-	-	**2**	-	-	**2**	-	-	-

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
V Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT14503	**CONSTITUTION OF INDIA**	3	0	0	-	**100**
Objective(s)	**The student should be made to:** • Know about the Fundamentals of Indian Constitution. • Learn about Functionalities of Central Government in India. • Understand Functionalities of State Government in India. • Have the basics knowledge of Constitution Functions. • Learn about Indian society.					
Outcome(s)	**On Completion of the course, the students should be able to:** • Summarize the functions of the Indian government • Describe the structure of Union government. • Discuss the Functionalities of State Government in India. • Explain the relation between Union and State • Recognize the need of Indian society					
UNIT-I	**INTRODUCTION**					**9**
Constitutional Development since 1909 to 1947- Making of the Constitution– Constituent Assembly of India – Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.						
UNIT-II	**STRUCTURE AND FUNCTION OF CENTRAL GOVERNMENT**					**9**
Union Government – Structures of the Union Government and Functions – President – Vice President – Prime Minister – Cabinet – Parliament – Supreme Court of India – Judicial Review.						
UNIT-III	**STRUCTURE AND FUNCTION OF STATE GOVERNMENT**					**9**
State Government – Structure and Functions – Governor – Chief Minister – Cabinet – State Legislature – Judicial System in States – High Courts and other Subordinate Courts.						
UNIT-IV	**CONSTITUTION FUNCTIONS**					**9**
Indian Federal System-Secularism-Social Justice-Minority Safeguards – Center – State Relations – President's Rule – Constitutional Amendments – Constitutional Functionaries - Assessment of working of the Parliamentary System in India.						
UNIT-V	**INDIAN SOCIETY**					**9**
Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections.						
					TOTAL HOURS	**45**

TEXT BOOKS:	
1	Durga Das Basu, "Introduction to the Constitution of India ", Prentice Hall of India, New Delhi
2	Kapur. A.C: Indian Government and Political System; S.Chand and Company Ltd., New Delhi.
REFERENCES:	
1	Sharma, Brij Kishore, " Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2	U.R.Gahai, "Indian Political System ", New Academic Publishing House, Jalaendhar
3	R.N. Sharma, "Indian Social Problems ", Media Promoters and Publishers Pvt. Ltd.
4	Johari J.C.: Indian Politics, Vishal Publications Ltd, New Delhi
5	R.C.Agarwal, (1997) "Indian Political System", S.Chand and Company, New Delhi.
6	Maciver and Page, " Society: An Introduction Analysis ", Mac Milan India Ltd., New Delhi.
7	K.L.Sharma, (1997) "Social Stratification in India: Issues and Themes", Jawaharlal Nehru University, New Delhi.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	-	-	-	-	-	3	-	3	-	-	-	-	-	-	-
CO2	-	-	-	-	-	3	-	3	-	-	-	-	-	-	-
CO3	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO4	-	-	-	-	-	3	-	2	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3	-	3	-	-	-	-	-	-	-
Average	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**				**Programme Code**	**2071**
V Semester						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT24501	**MULTIMEDIA LABORATORY**	0	0	3	1.5	**100**
Objective(s)	**The student should be made to:** • Know the line drawing using programming language. • Understand the 2D and 3D transformations • Understand the 2D animations using animation software.					
Outcome(s)	**Upon completion of this course , students will be able to** • Explain line drawing using programming language.. • Explain 2D and 3D transformations • Demonstrate simple 2D animations using animation software.					
LIST OF EXPERIMENTS						
1. To implement Line, Circle and ellipse Attributes 2. To implement line drawing algorithms DDA line algorithm, Bresenham's line algorithm 3. To perform 2D and 3D transformations 4. To perform animation using any Animation software (Create Frame by Frame Animations using multimedia authoring tools) 5. To perform basic operations on image using any image editing software 6. To develop a presentation for a product using techniques like Guide Layer, masking and Onion Skin using authoring tools. 7. To create a Jpeg image that demonstrates the various features of an image editing tool.						
					TOTAL HOURS	**30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2		3	3	-	-	-	2	2	2	2	2	-	-
CO2	2	2		2	2	-	-	-	2	2	2	2	1	1	-
CO3	2	2		3	3	-	-	-	2	2	2	2	-	2	-
Average	**2**	**2**		**2.6**	**2.6**	**-**	**-**	**-**	**2**	**2**	**2**	**2**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**				**2071**
V Semester						
Course Code	**Course Name**	**Hours /Week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT24502	**WEB TECHNOLOGY LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objective(s)	**The student should be made to:** • Understand the various web page elements using HTML and style sheets. • Learn the different ways of developing web applications. • Know about the project development using JavaScript.					
Outcome(s)	**At the end of the course, the students will be able to:** • Develop interactive web pages using HTML, CSS, JavaScript and Bootstrap • Develop a web application to maintain information in a database using server-side scripting • Apply the concepts of Angular to design full-fledged web applications.					

LISTOF EXPERIMENTS	
1	Design a web page using HTML tags and host it in github repository.
2	Design an attractive webpage using style sheets.
3	Design a responsive website using Bootstrap.
4	Design a webpage to create simple interactive CGPA calculator using Event Handling.
5	Design a web application using HTTP Request and HTTP Response
6	Develop simple login page by performing event handling using GET and POST method.
7	Design a simple calculator using —Modules‖ in Node.js.
8	Design a webpage to maintain personal information using CRUD operations in MongoDB.
9	Design a Payroll Management System using typescript
10	Design a reactive form to maintain personal information and perform validation using Angular. Suggested domains for Mini-Project: 1.Bank Management system 2. E-ticketing system 3. Online Course Registration system 4. Passport Automation system
TOTAL HOURS	**30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	2	2	2	2	3	-	-	-	-	-	-	-	2	2	-
CO3	2	2	3	1	3	-	-	-	-	-	-	-	2	1	-
Average	**2**	**2.3**	**2.3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus - Regulation 2022

Department	**English**

Semester – V
(Common to all B.E./B.Tech. Programmes)

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22EN60002(R)	**INTERVIEW SKILLS AND SOFT SKILLS** (Common to all B.E./B.Tech. Degree Programmes)	0	1	2	2	**100**

Objectives	➢ To improve the learners reading fluency skills through extensive reading ➢ To help the learners obtain speaking skills in both formal and informal situation. ➢ To make them acquire presentation skills and interview skills to face challenges in the career aspects
Outcomes	**At the end of the course, the learners will be able to :** ➢ Analyse the content and apply knowledge and skills efficiently wherever necessary. ➢ Create profile and other essential documents. ➢ Demonstrate soft skills effectively at the time of interview and workplace.

LIST OF EXERCISES

1.	Introduction to Employability Skills
2.	Reading Comprehension
3.	Listening Comprehension
4.	Professional Email Writing
5.	Preparing One Page Resume
6.	Interview Skills (Mock Interview & Interview Etiquette)
7.	Corporate Skills (Polite Expressions, Telephone Etiquette, Online Etiquette & PPT Presentation)
8.	Group Discussion
9.	Soft Skills (Interpersonal, Intrapersonal, Leadership, Decision Making and Problem Solving)
10.	Public Speaking

Total Hrs : 30

Textbook:	
1	Joshi, Manmohan, *Soft Skills*, 1st Edition. Bookboon, 2017
References:	
1	Raman, Meenakshi & Sangeeta Sharma, *Technical Communication: Principles and Practice*, Ed.III,Oxford University Press, New Delhi. 2015.
2	Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, New Delhi, 2011
Online Websites:	
https:// www.ted.com/talks	
https://www.joshtalks.com	
https://quizziz.com	
www.pdfdrive.com	
www.talking books.com	

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	-	-	-	-	-	-	-	2	3	2	-	2	-	-	-
CO2	-	-	-	-	-	-	-	2	3	3	-	2	-	-	-
CO3	-	-	-	-	-	-	-	2	3	3	-	2	-	-	-
Average	-	-	-	-	-	-	-	**2**	**3**	**2.6**	-	**2**	-	-	-

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

FS 68172

Regulations 2022

VI Semester

Sl. No.	Course code	Course Title	L	T	P	C	Category
	THEORY						
1		Managerial Skills and Quality Management	3	0	0	3	EEC
2	22IT14601	Artificial Intelligence with Machine Learning	3	0	0	3	PC
3	22IT14602	Cloud Computing	3	0	0	3	PC
4	22IT14603	Blockchain Technology	3	0	0	3	PC
5		Program Elective–3	3	0	0	3	PE
6		Open Elective –4	3	0	0	3	OE
	PRACTICAL						
7	22IT24601	Artificial Intelligence Laboratory	0	0	3	1.5	PC
8	22IT24602	Cloud Computing Laboratory	0	0	3	1.5	PC
9	22IT36601	Mini Project	0	0	6	3	EEC
		TOTAL	**18**	**0**	**12**	**24**	

BoS Chairman
Dr.S.Raju

Regulations 2022						
Department		**Programme Code**				
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**
	Managerial Skills, Project and Quality Management	**L**	**T**	**P**	**C**	**100**
		3	**0**	**0**	**3**	
Mandatory Credit Course to All UG Programmes to be offered in V/ VI/VII Semester						
Objectives	This course is designed to: 1. Develop knowledge and skills needed for the successful managerial performance. 2. Develop team building and communication skills in learners for working in multi-disciplinary teams. 3. Enable the learners to plan, schedule and manage projects. 4. Facilitate budgeting and finance, and evaluate projects 5. Understand the importance of quality concepts and principles.					
Outcomes	Upon completion of this course, the Learners will be able to : CO1: Demonstrate applicable knowledge and skills needed for managerial effectiveness. CO2: Demonstrate team building and communication skills for working in multi-disciplinary teams. CO3: Plan, schedule and manage projects CO4: Plan budgeting, manage finance and evaluate projects CO5: Summarize the quality concepts and principles.					
UNIT-I	**INTRODUCTION TO MANAGERIAL SKILLS**					**9**
Introduction to Self Awareness – Self Portrait – Self Assessment – Life-long learning. Definition of Life Skills and Managerial Skills – Need and Importance of Skills. Decision Making and Problem Solving: Problem Analysis –Techniques – Steps; Problem solving: Characteristics of Complex problems – Problem Solving Strategies – Barriers.; Lateral thinking Need and Importance of Lateral Thinking; Logic and Rationality – Functions – Personal and Work ethics-Case study						
UNIT-II	**TEAM BUILDING AND EFFECTIVE COMMUNICATION**					**9**
Team Building: Developing teams and team work, advantages of team, leading team, team membership, traits of working in multi-disciplinary teams. Effective Communication: Need and Importance – Techniques and Types - Verbal and Non-Verbal Communication - Barriers to communication – Overcoming barriers – Multiple Intelligences – 360 degree evaluation, Case Study.						
UNIT-III	**PROJECT MANAGEMENT**					**9**
Project: Meaning and Importance of terms ‘Event’, Activity’. ‘Time”. Identification of project opportunities, Screening of Project Ideas. Criteria for project selection, Project planning and scheduling – Application of CPM and PERT – Examples and case studies.						
UNIT-IV	**BUDGETING AND FINANCE**					**9**

Introduction to Budgeting and Finance, kinds of Project Evaluation, Evaluation Techniques – Non-discounted cash flow methods, Discounted cash flow Methods, Evaluation of Project cost, Capital budgeting and its methods. Financial management of Projects. Project Risk and its mitigation – Examples and case studies.		
UNIT-V	**QUALITY CONCEPTS AND PRINCIPLES**	**9**
Introduction - Need for Quality - Evolution of Quality - Definition of Quality - Dimensions of Manufacturing Quality and Service Quality. TQM culture, Leadership – quality council, employee involvement, motivation, empowerment, recognition and reward Performance appraisal - Continuous process improvement, 6σ, 5s, Kaizen - Case Study.		
	Total	**45 HOURS**

TEXTBOOKS:	
1	David A.Whetten and Kim S.Cameron, Developing Management Skills, – PHI, 2011.
2	Harper, Nancy Life Skills: Essential for Personal Growth on the Ever Changing Road of Life. Bloomington, IN: Author House, 2011.
3	Adair, J. Decision Making and Problem Solving. UK: Kogan Page Publishers.2013.
4	James R Evans, Quality Management, Cengage Learning India Private Limited 2010.
5	Janakiraman. B and Gopal .R.K., "Total Quality Management – Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
6	Prasanna Chandra "ProjectPlanning, Analysis, Selection, Financing, Implementation and Review, Tata Mcgraw-Hill, 2002
REFERENCES:	
1	Kallet, Michael Think Smarter: Critical Thinking to Improve Problem-Solving and Decision Making Skills. New Jersey: John Wiley & Sons, 2014.
2	Adair, J. & Allen, M. Time Management and Personal Development. London: Hawksmere, 1999.
3	Hattie, John Self-Concept. New York: Psychology Press, 2014.
4	Mcgrath E.H., S.J., Basic Managerial Skills for all, 9th Edition, PHI, 2012
5	Amitava Mitra, Fundamentals of Quality Control & Improvement, Wiley Publications, 2012.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	2	2	-	-	-	-	-
CO2	1	2	-	-	-	-	-	-	2	1	-	-	-	-	-
CO3	2	1	-	-	-	-	-	-	2	1	-	-	-	-	-
CO4	2	1	-		-	-	-	-	1	2	-	-	-	-	-
CO5	2	1	-	-	-	-	-	-	2	2	-	-	-	-	-
Average	**1.8**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1.8**	**1.6**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRAENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
VI Semester							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
		L	**T**	**P**	**C**		
22IT14601	**ARTIFICIAL INTELLIGENCE WITH MACHINE LEARNING**	3	0	0	3	**100**	
Objective(s)	**The student should be made to:** • Study about uninformed and Heuristic search techniques. • Learn techniques for reasoning under uncertainty • Introduce Machine Learning and supervised learning algorithms • Study about ensembling and unsupervised learning algorithms • Learn the basics of deep learning using neural networks						
Outcome(s)	**Upon completion of this course , students will be able to** • Use appropriate search algorithms for problem solving • Apply reasoning under uncertainty • Build supervised learning models • Build ensembling and unsupervised models • Build deep learning neural network models						
UNIT-I	**INTRODUCTION**						**9**
Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search – constraint satisfaction problems (CSP)							
UNIT-II	**KNOWLEDGE REPRESENTATION AND REASONING**						**9**
Proposition Logic - First Order Predicate Logic – Unification – Forward Chaining -Backward Chaining - Resolution – Knowledge Representation - Ontological Engineering - Categories and Objects – Events-Mental Events and Mental Objects - Reasoning Systems for Categories - Reasoning with Default Information .							
UNIT-III	**INTRODUCTION TO MACHINE LEARNING**						**9**
Introduction to machine learning – Linear Regression Models: Least squares, single & multiple variables, Bayesian linear regression, gradient descent, Linear Classification Models: Discriminant function – Probabilistic discriminative model - Logistic regression, Probabilistic generative model – Naive Bayes, Maximum margin classifier – Support vector machine, Decision Tree, Random forests							
UNIT-IV	**ENSEMBLE TECHNIQUES AND UNSUPERVISED LEARNING**						**9**
Combining multiple learners: Model combination schemes, Voting, Ensemble Learning - bagging, boosting, stacking, Unsupervised learning: K-means, Instance Based Learning: KNN, Gaussian mixture models and Expectation maximization.							
UNIT-V	**NEURAL NETWORKS**						**9**

Perceptron - Multilayer perceptron, activation functions, network training – gradient descent optimization – stochastic gradient descent, error backpropagation, from shallow networks to deep networks –Unit saturation (aka the vanishing gradient problem) – ReLU, hyperparameter tuning, batch normalization, regularization, dropout.	
TOTAL HOURS	**45**

TEXT BOOKS:	
1	Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson Education, 2021.
2	Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Fourth Edition, 2020.
REFERENCES:	
1	Kevin Night and Elaine Rich, Nair B., "Artificial Intelligence (SIE)", McGraw Hill- 2008. .
2	Dan W. Patterson, "Introduction to AI and ES", Pearson Education, 2007.
3	Deepak Khemani "Artificial Intelligence", Tata Mc Graw Hill Education 2013.(http://nptel.ac.in/)

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	2	-	-	-	-	1	-	-
CO2	2	3	1	-	-	-	-	2	-	2	-	-	2	-	-
CO3	3	-	-	-	-	-	-	2	-	2	-	-	2	-	-
CO4	2	2	3	-	-	-	-	2	-	2	-	-	2	-	-
CO5	2	-	1	-	-	-	-	2	-	2	-	-	2	-	-
Average	**2.4**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**1.6**	**-**	**-**	**1.8**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
VI Semester							
Course code	**Course Name**	**Hours/week**				**Credit**	**Maximum Marks**
		L	**T**	**P**		**C**	
22IT14602	**CLOUD COMPUTING**	3	0	0		3	**100**
Objective(s)	**The student should be made to:** • Familiar with the fundamentals of cloud computing • Gain expertise in server, network and storage virtualization. • Learn fundamental concepts in cloud architecture, storage and services • Understand the cloud resource management and security issues • Know about the advanced topics in cloud computing and applications						
Outcome(s)	**Upon completion of this course , students will be able to** • Explain the main concepts, key technologies, strengths and limitations of cloud computing. • Describe various technologies in server, network and storage virtualization • Interpret the architecture of compute and storage cloud, service and delivery models • Identify the main security and privacy issues in cloud computing • Choose appropriate technologies for implementation and application of cloud						
UNIT-I	**INTRODUCTION**						**9**
Introduction to Cloud Computing- Evolution of Cloud Computing – Underlying principles of parallel and distributed computing– Cloud characteristics – Elasticity in Cloud –On-demand Provisioning-Introduction to AWS-Architecture and Management Console-AWS Workspaces.							
UNIT-II	**VIRTUALIZATION INFRASTRUCTURE**						**9**
Virtual Machine Basics–Taxonomy of Virtual machines– Process and System Virtual Machines – Server Virtualization –Virtual Workloads – Provision Virtual Machines – Desktop Virtualization – Application Virtualization - Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory and I/O devices – virtual clusters and Resource Management – Virtualization for data center automation.							
UNIT-III	**CLOUD ARCHITECTURE, SERVICES AND STORAGE**						**9**
Layered Cloud Architecture Design – NIST Cloud computing Reference architecture – Public, private and hybrid clouds – IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.							
UNIT-IV	**RESOURCE MANAGEMENT AND SECURITY IN CLOUD**						**9**
Inter Cloud Resource Management- Resource bundling: Combinatorial auctions for cloud resources – Resource Provisioning and Resource Provisioning methods – Global Exchange of Cloud resources – Networking support - Cloud Security Overview and Challenges – Software-as-a-service Security – Security governance – Virtual Machine security – IAM – Security Standards							

UNIT-V	CLOUD TECHNOLOGIES AND APPLICATIONS	9
Hadoop – Map Reduce – Virtual Box – Programming support :Google App Engine -Amazon AWS – Federation in the Cloud and Four levels of Federation– Federated services and applications – Future of federation- Case Study – Cloud Computing for Software Parks– an Enterprise with Multiple Data Centers		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Kai Hwang, Geoffrey C.Fox, Jack G.Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
2	Rajkumar Buyya, Christian Vecchiola, S.Thamarai Sel "Mastering Cloud Computing: Foundations and Applications Programming", Morgan Kaufmann Publications, 2016.
REFERENCES:	
1	Rittinghouse, John W., and James F.Ransome, "Cloud Computing: Implementation, Management and Security", CRC Press, 2017.
2	Anthony Velte, Robert Elsenpeter, Toby Velte, "Cloud Computing, A Practical Approach", Tata Mc Graw Hill, 2009.
3	George Reese, "Cloud Application Architectures: Building Applications and Infrastructure in the Cloud: Transactional Systems for Ec2 and Beyond", O'Reilly, 2009.
4	Nptel course, Cloud Computing, https://onlinecourses.nptel.ac.in/noc18_cs16/preview
5	Dan C. Marinescu "Cloud Computing Theory and Practice", Morgan Kaufmann Publications, 2013.

COs Vs POs and PSOs Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**
CO1	3	2	-	-	-	2	-	1	-	-	-	-	3	-	-
CO2	2	2	-	-	-	2	1	-	-	1	-	1	2	3	-
CO3	2	2	2	1	-	2	2	2	-	2	-	-	3	3	-
CO4	2	2	2	2	-	2	-	2	-	1	-	-	3	3	-
CO5	2	2	2	2	-	2	2	-	-	1	-	-	2	2	-
Average	**2.2**	**2**	**1.2**	**1**	**-**	**2**	**5**	**1**	**-**	**1**	**-**	**1**	**2.6**	**2.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
VI Semester							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15023	**BLOCKCHAIN TECHNOLOGY**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The students will be made to** • Learn Blockchain's fundamental components and decentralization using block chain. • Know the working procedures of cryptocurrency. • Familiar the components of Ethereum and Programming Languages for Ethereum. • Expertise with the concepts of Hyperledger and Web3. • Gain knowledge about alternative Blockchains and Block chain projects.						
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the technology components of Blockchain and how it works behind the scenes. • Identify different approaches to developing decentralized applications. • Discuss Bitcoin and its limitations by comparing with other alternative coins. • Compare and contrast Hyperledger and Web3. • Illustrate the use of Hyperledger and its development framework.						
UNIT-I	**INTRODUCTION TO BLOCKCHAIN**					9	
History of Blockchain – Types of Blockchain – Consensus –Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain. Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization.							
UNIT-II	**BITCOIN AND CRYPTOCURRENCY**					9	
Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets –Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency-Smart Contracts – Ricardian Contracts.							
UNIT-III	**ETHEREUM**					9	
The Ethereum Network – Components of Ethereum Ecosystem –Metamask Setup, Ethereum Accounts, Transactions, Receiving Ethers- Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.							

UNIT-IV	**WEB3 AND HYPERLEDGER**	9
Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks – Hyperledger as a Protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.		
UNIT-V	**ALTERNATIVE BLOCKCHAINS AND APPLICATIONS**	9
Kadena – Ripple – Rootstock – Quorum – Tendermint – Scalability – Privacy –Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1.	Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.
2.	Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction" Princeton University Press, 2016
REFERENCES:	
1	Arshdeep Bahga, Vijay Madisetti, "Blockchain Applications: A Hands On Approach", VPT, 2017.
2	Andreas Antonopoulos, Satoshi Nakamoto, "Mastering Bitcoin", O'Reilly, 2014.
3	Roger Wattenhofer, "The Science of the Blockchain" CreateSpace Independent Publishing, 2016.
4	A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
5	Alex Leverington, "Ethereum Programming" Packt Publishing, 2017.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	3	2	-	-	-	-	-	-	1	-	-	2	1	-
CO2	2	2	2	-	-	-	-	-	-	1	-	2	2	-	-
CO3	2		2	-	-	-	-	-	-	2	-	2	-	2	-
CO4	3	-	-		-	-	-	-	-	2	-	-	1	1	-
CO5	3	-	-	-	-	-	-	-	-	2	-	1	-	1	-
Average	**2.4**	**1**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**1.6**	**-**	**1**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**		**Programme Code**		**2071**	
VI Semester						
Course Code	**Course Name**	**Hours/Week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT24701	**MACHINE LEARNING LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objective(s)	**The student should be made to:** • To learn to implement uninformed and informed search techniques. • To learn supervised learning models. • To explore the regression models.					
Outcome(s)	**Upon completion of this course, student will be able to** • Implement uninformed and informed search techniques • Develop supervised learning models • Develop regression models					

LISTOF EXPERIMENTS		
1.	Implementation of Uninformed search algorithms (BFS, DFS)	
2.	Implementation of Informed search algorithms (A*, memory-bounded A*)	
3.	Implement Naïve Bayes models	
4.	Implement Bayesian Networks	
5.	Build Regression models	
6.	Build Decision trees and random forests	
7.	Build SVM models	
8.	Implement Ensembling techniques	
9.	Implement Clustering algorithms	
10.	Implement EM for Bayesian networks	
11.	Build simple NN models	
	Total Hours	**30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	2	-	-	-	-	1	-	-
CO2	2	3	1	-	-	-	-	2	-	2	-	-	2	-	-
CO3	3	-	-	-	-	-	-	2	-	2	-	-	2	-	-
Average	**2.6**	**1**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**1.3**	**-**	**-**	**1.6**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
VI Semester							
Course code	**Course Name**	**Hours/week**				**Credit**	**Maximum marks**
		L	**T**	**P**		**C**	
22IT24602	**CLOUD COMPUTING LABORATORY**	0	0	3		1.5	**100**
Objective(s)	**The student should be made to:** • Understand the tool kits for cloud environment • Familiar with developing web services/Applications in cloud framework • Learn to run virtual machines of different configuration						
Outcome(s)	**Upon completion of this course, The students will be able to** • Apply the cloud tool kits • Design and implement applications on the Cloud. • Demonstrate an applications on Open Stack Installation						

LIST OF EXPERIMENTS	
1	Find procedure to run the virtual machine of different configuration. Check how many virtual machines can be utilized at particular time.
2	Find procedure to attach virtual block to the virtual machine and check whether it holds the data even after the release of the virtual machine.
3	Install a C compiler in the virtual machine and execute a sample program.
4	Show the virtual machine migration based on the certain condition from one node to the other.
5	Use GAE launcher to launch the web applications.
6	Show the working procedure and installation of Microsoft Azure7
Find	a procedure to launch virtual machine using trystack
8	Find procedure to launch KVM And Open stack Installation
9	Install Google App Engine. Create hello world app and other simple web applications using python/java.
10	Simulate a cloud scenario using cloudsim and run a scheduling algorithm that is not present in cloudsim
	TOTAL HOURS **30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	1	-	-	-	-	-	2	-	-	-	-	1	-	-
CO2	2	3	1	-	-	-	-	2	-	2	-	-	2	-	-
CO3	3	-	-	-	-	-	-	2	-	2	-	-	2	-	-
Average	**2.4**	**1.3**	**1**	**-**	**-**	**-**	**-**	**2**	**-**	**1.3**	**-**	**-**	**1.6**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)

FS 68172

DEPARTMENT OF INFORMATION TECHNOLOGY

Regulations 2022

VII Semester

Sl. No.	Course code	Course Title	L	T	P	C	Category
	THEORY						
1	22IT14701	Big Data Analytics	3	0	0	3	PC
2	22IT14702	Cyber Security	3	0	0	3	PC
3	22IT14703	Mobile Application Development	3	0	0	3	PC
4		Program Elective -4	3	0	0	3	PE
5		Open Elective-6	3	0	0	3	OE
	PRACTICAL						
6	22IT24701	Big Data Analytics Laboratory	0	0	3	1.5	PC
7	22IT24702	Mobile Application Development Laboratory	0	0	3	1.5	PC
8	22IT26701	Internship in Industry	0	0	2	1.5	EEC
		TOTAL	**15**	**0**	**08**	**19.5**	

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Information Technology**	**Programme Code**	2071

VII Semester

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT14701	**BIG DATA ANALYTICS**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • Be familiar with the concepts of big data • Explore the fundamental concepts of big data and analytics • Learn the basics of big data technologies. • Be aware of applications using Map Reduce Concepts • Understand the usage of Hadoop related tools for Big Data Analytics
Outcome(s)	**Upon completion of this course , students will be able to** • Explain the different types of quantitative data • Summarize the empirical distribution of data, and create simple visualizations. • Determine the big data analytics techniques using big data platform.. • Analyze the HADOOP and Map Reduce technologies associated with big data analytics • Implement big data applications using Hadoop-related tools such as HBase, Cassandra, Pig, and Hive .

UNIT-I	**INTRODUCTION TO BIG DATA**	**12**

Evolution of Big data – Best Practices for Big data Analytics – Big data characteristics – Validating – The Promotion of the Value of Big Data – Big Data Use Cases- Characteristics of Big Data Applications – Perception and Quantification of Value -Understanding Big Data Storage.

UNIT-II	**BIG DATA ANALYTICS**	**12**

Overview of Business Intelligence - Data Science and Analytics - Meaning and Characteristics of big data analytics - Need of big data analytics - Classification of analytics - Challenges to big data analytics - Importance of big data analytics - Basic terminologies in big data environment.

UNIT-III	**BIG DATA TECHNOLOGIES AND DATABASES**	**12**

Introduction to NoSQL - Uses - Features and Types – Need – Advantage - Disadvantages and Application of NoSQL - Overview of NewSQL - Comparing SQL - NoSQL and NewSQL - Introduction to MongoDB and its needs - Characteristics of MongoDB - Introduction of apache cassandra and its needs - Characteristics of Cassandra.

UNIT-IV	HADOOP FOUNDATION FOR ANALYTICS AND MAPREDUCE	12
History –Features - Key advantage and Versions of Hadoop - Essential of Hadoop ecosystems - RDBMS versus Hadoop - Key aspects and Components of Hadoop - Hadoop architectures - Hadoop Map Reduce: Introduction to MapReduce - Processing data with Hadoop using MapReduce.		
UNIT-V	**HADOOP RELATED TOOLS**	**12**
Hbase – data model and implementations – Hbase clients – Hbase examples – praxis. Pig – Grunt – pig data model – Pig Latin – developing and testing Pig Latin scripts. Hive – data types and file formats – HiveQL data definition – HiveQL data manipulation – HiveQL queries		
	TOTAL HOURS	**60**

TEXT BOOKS :	
1	Seema Acharya, Subhashini Chellappan – "Big Data and Analytics", Wiley 2015 Edition.
2	Minelli, Chambers, Dhiray- "Big Data Big Analytics", John Wiley & Sons, Inc, Copyright 2013.
REFERENCES:	
1	Bart Baesens – "Analytics in a Big Data World", John Wiley & Sons, Inc, Copyright 2013
2	Boris Lublinsky, Kevin T. Smith – "Hadoop Solutions", Wrox, 1st Edition, Kindle Edition.
3	Chuck Lam – "Hadoop in Action", Dreamtech- Paperback – 25 Dec 2010.
4	Ethem Alpaydin – "Introduction to Machine Learning", MIT Press 3rd Edition 2015
5	https://nptel.ac.in/courses/106104189/big data computing

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	-	-	2	2	2	2	-
CO2	2	2	2	-	-	-	-	-	-	-	2	2	2	2	-
CO3	2	1	-	-	-	-	-	-	-	-	2	2	1	2	-
CO4	2	2	2		-	-	-	-	-	-	2	2	2	2	-
CO5	2	1	-	-	-	-	-	-	-	-	2	2	1	2	--
Average	**2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**1.6**	**2**	

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Information Technology**	**Programme Code**	**2071**

VII Semester

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT14702	**CYBER SECURITY**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • Understand the basics of Cyber Security Standards and Policies. • Know the legal, ethical and professional issues in Cyber security. • Learn the Cyber Frauds and Abuse and its Security Measures. • Identify the technological aspects of Cyber Security. • Be familiar with security policies in cyber forensics.
Outcome(s)	**Upon completion of this course , students will be able to** • Explain the basics of computer forensics. • Outline the strategies adopted in computer forensics. • Summarize the occurrence of Cybercrime in mobile and wireless environment. • Implement relevant methods and techniques in cybercrime.• Apply the security policies in cyber forensics.

UNIT-I	**FUNDAMENTALS OF CYBER SECURITY**	**9**
Cyber Security – History of Internet – Impact of Internet – CIA Triad; Reason for Cyber Crime – Need for Cyber Security – History of Cyber Crime– A Global Perspective on Cyber Crimes; Cyber Laws – The Indian IT Act – Cybercrime and Punishment.		
UNIT-II	**CYBERCRIME AND CYBEROFFENSES**	**9**
Cybercrime and Information Security – Cybercriminals – Classifications of Cybercrimes – Email Spoofing – Spamming – Cyber defamation – Internet Time Theft – Forgery – Web jacking – Hacking – Online Frauds – Software Piracy – Mail Bombs – Password Sniffing – Cyberoffenses – Categories – Planning the attacks – Cyberstalking – Cybercafe and Cybercrimes – Botnets.		
UNIT-III	**CYBERCRIME: MOBILE AND WIRELESS DEVICES**	**9**
Proliferation of Mobile and Wireless Devices – Trends in Mobility – Credit card frauds in Mobile and Wireless Computing – Security Challenges – Authentication Service Security – Attacks on Mobile Phones.		
UNIT-IV	METHODS AND TECHNIQUES USED IN CYBERCRIME	**9**
Proxy Servers and Anonymizers – Phishing – Password Cracking – Keyloggers and Spywares – Virus and Worms – Trojan Horses and Backdoors – Steganography – DoS and DDoS Attacks.		
UNIT-V	**SECURITY POLICIES**	**9**

Introduction - Defining User Policies – Passwords – Internet Use – Email Usage – Installing/ Uninstalling Software – Instant Messaging – Defining System Administrative Policies – Defining Access Control Developmental Policies Standards, Guidelines and Procedures – Basics of assessing a system	
TOTAL HOURS	**45**

TEXT BOOKS :	
1	Anand Shinde, "Introduction to Cyber Security Guide to the World of Cyber Security", Notion Press, 2021 (Unit 1)
2	Nina Godbole, SunitBelapure, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives", Wiley, 2011.
3	Chuck Easttom, "Computer Security Fundamentals", 2nd Edition, Pearson Education, 2012.
REFERENCES:	
1	John R.Vacca,Computer Forensics, Cengage Learning, 2005.
2	Richard E.Smith, Internet Cryptography, 3rd Edition Pearson Education, 2008.
3	MarjieT.Britz, Computer Forensics and Cyber Crime: An Introduction, 3rd Edition, Prentice Hall, 2013.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	-	-	2	2	2	2	-
CO2	2	2	2	-	-	-	-	-	-	-	2	2	2	2	-
CO3	3	-	-	-	-	-	-	-	-	-	2	2	1	2	-
CO4	2	2	2		-	-	-	-	-	-	2	2	1	2	-
CO5	2	1	-	-	-	-	-	-	-	-	2	2	1	2	--
Average	**2.2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**1.4**	**2**	

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Professional Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT14703	MOBILE APPLICATION DEVELOPMENT	3	0	0	3	100

Objective(s)	**The student should be made to:** • Understand about the basis of Android in detail. • Know about different Android Views and Layout of Application development • Learn Graphical User Interface design with different views. • Understand the enterprise scale requirements of mobile applications • Know the mobile applications framework
Outcome(s)	Upon completion of this course- the student will be able to do: • Explain the Android basic with requirements of the application development. • Apply the different views, view group and layouts.. • Design the Graphical user Interface with different components. • Elaborate the Android Framework. And various models. • Identify the purpose of Android Thread and Handlers.

UNIT-I	**INTRODUCTION**	**9**

What is Android, Android versions and its feature set The various Android devices on the market , The Android Market application store ,Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).

UNIT-II	**UNDERSTANDING ANDROID VIEWS, VIEW GROUPS AND LAYOUTS**	**9**

Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool

UNIT-III	**GRAPHICAL USER INTERFACE SCREEN WITH VIEWS**	**9**

Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with SeekBar, Working with Menus using view.

UNIT-IV	**ANDROID FRAMEWORK OVERVIEW**	**9**

Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components Android Manifest XML: Declaring Your Components.

UNIT-V	A BASIC OVERVIEW OF ANDROID THREADS AND THREAD HANDLERS	9
An Overview of Threads, The Application Main Thread, Thread Handlers, A Basic Threading Example, Creating a New Thread, Implementing a Thread Handler, Passing a Message to the Handler.		
	TOTAL HOURS	**45**

TEXT BOOKS :	
1	Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 3rd edition, 2017;
2	Rajiv Ramnath, Roger Craws, and Paolo Sivilotti, Android SDK 3 for Dummies, Wiley 2015
REFERENCES:	
1	Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O'Reilly Media, 2016;
2	Christian Keur and Aaron Hillegass, iOS Programming: The Big Nerd Ranch Guide, 6th edition, 2016;
3	Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004;

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	1	2	-	-	-	-	-	2	2	-	-	2	2	-
CO2	3	-	-	-	-	-	-	-	2	2	2	2	3	3	-
CO3	3	-	-	-	-	-	-	-	2	2	2	2	3	3	-
CO4	2	3	3	-	-	-	-	-	2	2	-	-	3	2	-
CO5	2	1	-	-	-	-	-	-	2	2	2	2	3	3	-
Average	**2.4**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**1.2**	**1.2**	**2.8**	**2.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Information Technology**	**Programme Code**	**2071**

VII Semester

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT24701	**BIG DATA ANALYTICS LABORATORY**	0	0	3	1.5	**100**

Objective(s)	**The student should be made to:** • Know about Map Reduce programs for processing big data. • Study the Installation of PIG. • Understand the usage of Hive .
Outcome(s)	**Upon completion of this course , students will be able to** • Process big data using Hadoop framework. • Write and run the Pig Latin scripts. • Illustrate the different operations on relations and databases using Hive.

LIST OF EXPERIMENTS

1. To Study of Hadoop installation and HDFS.
2. Implement word count / frequency programs using Map Reduce.
3. Implement Map reduce program that processes a weather dataset.
4. Implement matrix multiplication with Hadoop Map Reduce.
5. To Study the Installation of PIG.
6. Write Pig Latin scripts sort, group, join, project, and filter your data.
7. Run the Pig Latin Scripts to find Word Count.
8. Run the Pig Latin Scripts to find a max temp for each and every year.
9. To Study Installation of HIVE.
10. Use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

TOTAL HOURS	**30**

COs Vs POs and PSOs Mapping

Course Outcomes	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**	**PS O3**
CO1	2	2	2	2	2	-	-	-	-	-	2	2	1	-	-
CO2	2	2	3	-	-	-	-	-	-	-	2	2	2	-	-
CO3	2	2	3	2	2	-	-	-	-	-	2	2	2	1	-
Average	**2**	**2**	**2.6**	**1.3**	**1.3-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**1.6**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**				**2071**
VII Semester						
Course Code	**Course Name**	**Hours /Week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT24702	**MOBILE APPLICATION DEVELOPMENT LABORATORY**	**0**	**0**	**3**	**1.5**	**100**
Objective(s)	**The student should be made to:** • Understand the components and structure of mobile application development frameworks for Android and windows OS based mobiles. • Understand how to work with various mobile application development frameworks. • Learn the basic and important design concepts and issues of development of mobile applications.					
Outcome(s)	**Upon completion of this course, students will be able to:** • Develop mobile applications using GUI and Layouts. • Develop mobile applications using Event Listener.• Implement mobile applications using Databases.					

LISTOF EXPERIMENTS		
1.	Develop an application that uses GUI components, Font and Colors	
2.	Develop an application that uses Layout Managers and event listeners	
3.	Write an application that draws basic graphical primitives on the screen.	
4.	Develop an application that makes use of databases.	
5.	Develop an application that makes use of Notification Manager	
6.	Implement an application that uses Multi-threading	
7.	Develop a native application that uses GPS location information	
8.	Implement an application that writes data to the SD card.	
9.	Implement an application that creates an alert upon receiving a message	
10.	Write a mobile application that makes use of RSS feed	
11.	Develop a mobile application to send an email.	
12.	Develop a Mobile application for simple needs (Mini Project)	
	TOTAL HOURS	**30**

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	2	2	-	-	-	-	-	2	2	1	-	-
CO2	2	2	3	-	-	-	-	-	-	-	2	2	2	-	-
CO3	2	2	3	2	2	-	-	-	-	-	2	2	2	1	-
Average	**2**	**2**	**2.6**	**1.3**	**1.3-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**1.6**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

PROGRAM ELECTIVES (PE)

S.NO	COURSE CODE	COURSE TITLE	L	T	P	C	CATEGORY
CLOUD COMPUTING AND DATA CENTER TECHNOLOGIES							
1	22IT15001	Information Storage and Management	3	0	0	3	PE
2	22IT15002	Optimization Techniques	3	0	0	3	PE
3	22IT15003	Multi-Core Computing	3	0	0	3	PE
4	22IT15004	Distributed Computing	3	0	0	3	PE
5	22IT15005	Green Computing	3	0	0	3	PE
6	22IT15006	Virtualization Techniques	3	0	0	3	PE
7	22IT15007	Web Development Frameworks	3	0	0	3	PE
8	22IT15008	Information Retrieval Techniques	3	0	0	3	PE
APPLICATION DEVELOPMENT							
9	22IT15009	Open Source Software	3	0	0	3	PE
10	22IT15010	Agile Methodologies	3	0	0	3	PE
11	22IT15011	DevOps	3	0	0	3	PE
12	22IT15012	Software Testing	3	0	0	3	PE
13	22IT15013	C# and .Net Programming	3	0	0	3	PE
14	22IT15014	Advanced Java Programming	3	0	0	3	PE
15	22IT15015	Software Project Management	3	0	0	3	PE
16	22IT15016	Modeling and Simulation	3	0	0	3	PE
ARTIFICIAL INTELLIGENCE							
17	22IT15017	Data Warehousing and Data Mining	3	0	0	3	PE
18	22IT15018	Computer Vision	3	0	0	3	PE
19	22IT15019	Natural Language Processing	3	0	0	3	PE
20	22IT15020	Bio-Informatics	3	0	0	3	PE

21	22IT15021	Human Computer Interaction	3	0	0	3	PE
22	22IT15022	Robotics and Automation	3	0	0	3	PE
23	22IT15023	Text to Speech Analysis	3	0	0	3	PE
24	22IT15024	Soft Computing	3	0	0	3	PE
25	22IT15025	Game Theory	3	0	0	3	PE
26	22IT15026	Knowledge Engineering	3	0	0	3	PE
NETWORK AND DATA SECURITY							
27	22IT15027	Cyber Physical Systems	3	0	0	3	PE
28	22IT15028	Cyber Forensics	3	0	0	3	PE
29	22IT15029	Information Security	3	0	0	3	PE
30	22IT15030	Ethical Hacking	3	0	0	3	PE
31	22IT15031	Security & Privacy in Cloud	3	0	0	3	PE
32	22IT15032	Embedded Systems and IOT	3	0	0	3	PE
33	22IT15033	Social Network Analysis	3	0	0	3	PE
34	22IT15034	5G Networks	3	0	0	3	PE
35	22IT15035	Satellite Communication	3	0	0	3	PE
CREATIVE MEDIA							
36	22IT15036	Augmented Reality/Virtual Reality	3	0	0	3	PE
37	22IT15037	Multimedia and Animation	3	0	0	3	PE
38	22IT15038	Video Creation and Editing	3	0	0	3	PE
39	22IT15039	Digital marketing	3	0	0	3	PE
40	22IT15040	Game Development	3	0	0	3	PE
41	22IT15041	Multimedia Data Compression and Storage	3	0	0	3	PE
42	22IT15042	Digital Image Processing	3	0	0	3	PE
43	22IT15043	E-Learning Techniques	3	0	0	3	PE

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
22IT15001	**INFORMATION STORAGE AND MANAGEMENT**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • Understand the basic components of Storage System Environment. • Understand the Storage Area Network Characteristics and Components. • Know about the emerging technologies in IP-SAN. • Understand the different backup and recovery topologies and their role in providing disaster recovery and business continuity capabilities. • Understand the local and remote replication technologies.						
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the logical and physical components of a Storage infrastructure. • Evaluate storage architectures, including storage subsystems, DAS, SAN, NAS, and CAS. • Summarize the various forms and types of Storage Virtualization. • Describe the different role in providing disaster recovery and business continuity capabilities. • Distinguish different remote replication technologies.						
UNIT-I	**STORAGE SYSTEMS**						**9**
Introduction to Information Storage and Management: Information Storage, Evolution of Storage Technology and Architecture, Data Center Infrastructure, Key Challenges in Managing Information, Information Lifecycle. Storage System Environment: Components of the Host. RAID: Implementation of RAID, RAID Array Components, RAID Levels, RAID Comparison, RAID Impact on Disk Performance, Hot Spares. Intelligent Storage System: Components, Intelligent Storage Array. Third Platform Technologies: Cloud computing and its essential characteristics, Cloud services and cloud deployment models							
UNIT-II	**STORAGE NETWORKING TECHNOLOGIES**						**9**
Direct-Attached Storage and Introduction to SCSI: Types of DAS, DAS Benefits and Limitations, Disk Drive Interfaces, Introduction to Parallel SCSI, SCSI Command Model. **Storage Area Networks:** Fiber Channel, SAN Evolution, SAN Components, Fiber Channel Connectivity, Fiber Channel Ports, Fiber Channel Architecture, Zoning, Fiber Channel Login Types, Fiber Channel Topologies. **Network Attached Storage:** Benefits of NAS, NAS File I/Components of NAS, NAS Implementations, NAS-Implementations, NAS File Sharing Protocols, NAS I/O Operations.							

UNIT-III	ADVANCED STORAGE NETWORKING AND VIRTUALIZATION	9
IP SAN: iSCSI, FCIP .**Content-Addressed Storage:** Fixed Content and Archives, Types of Archives, Features and Benefits of CAS, CAS Architecture, Object Storage and Retrieval in CAS, CAS Examples. **Storage Virtualization:** Forms of Virtualization, NIA Storage Virtualization Taxonomy, Storage Virtualization Configurations, Storage Virtualization Challenges, Types of Storage Virtualization. Data Center Environment-Building blocks of a data center- Software-defined data center		
UNIT-IV	**BUSINESS CONTINUITY**	**9**
Introduction to Business Continuity: Information Availability, BC Terminology, BC Planning Lifecycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions. **Backup and Recovery:** Backup Purpose, Considerations, Backup architecture, Backup targets, Data deduplication.Granularity, Recovery Considerations, Backup Methods and Process, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Technologies.		
UNIT-V	**REPLICATION**	**9**
Local Replication: Source and Target, Uses of Local Replicas, Data Consistency, Local Replication Technologies, Restore and Restart Considerations, Creating Multiple Replicas, Management Interface. **Remote Replication:** Modes of Remote Replication and its Technologies, Network Infrastructure.		
	TOTAL HOURS	**45**

TEXT BOOK :	
1	EMC Corporation-Second edition, Information Storage and Management, Wiley, India,2012
REFERENCES:	
1	Robert Spalding, —Storage Networks: The Complete Reference —, Tata McGraw Hill, Osborne, 2003.
2	Marc Farley, —Building Storage Networks, Tata McGraw Hill, Osborne, 2001.
3	Meeta Gupta, Storage Area Networks Fundamentals, Pearson Education Limited, 2002.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	3	3	3	2	-
CO2	2	2	2	-	-	-	-	-	1	1	3	3	3	2	-
CO3	2	2	-	-	-	-	-	-	1	1	3	3	3	2	-
CO4	2	1	2		-	-	-	-	2	2	3	3	3	2	-
CO5	2	2	-	-	-	-	-	-	2	-	3	3	3	2	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**3**	**3**	**3**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
22IT15002	**OPTIMIZATION TECHNIQUES**	**L**	**T**	**P**	**C**	**100**
		3	0	0	3	
Objective(s)	**The student should be made to:** • Understand the optimization problem and the classical optimization techniques. • Familiar with linear, dynamic programming, game theory and queuing models. • Provide a basic knowledge of nonlinear programming. • Gain knowledge about optimal solutions for multistage decision problems using dynamic programming • Familiarize with modern methods in optimization.					
Outcome(s)	**On completion of the course, the students will be able to:** • Analyze the optimization problem and the classical optimization techniques• Explain the linear programming model as a solution to various problems with linear functions • Describe the non-linear programming model to solve the constrained optimization problems • Develop the optimal solutions for multistage decision problems using dynamic programming • Apply modern optimization techniques to solve decision problems					

UNIT-I	**OPTIMIZATION PROBLEM**	**9**
Statement Of An Optimization Problem: Design Vector – Design Constraints – Constraint Surface – Objective Function – Classification Of Optimization Problems Classification Based On The Existence Of Constraints – Nature Of The Design Variables – Physical Structure Of The Problem – Nature Of The Equations Involved – Classical Optimization Techniques.		
UNIT-II	**LINEAR PROGRAMMING**	**9**
Standard Form Of A Linear Programming Problem – Geometry Of Linear Programming Problems – Definitions And Theorems – Solution Of A System Of Linear Simultaneous Equations – Pivotal Reduction Of A General System Of Equations.		
UNIT-III	**NON LINEAR PROGRAMMING**	**9**
Constrained Optimization Techniques – Random Search Methods – Complex Method – Sequential Linear Programming – Transformation Techniques – Basic Approach Of The Penalty Function Method – Interior Penalty Function Method – Convex Programming Problem – Exterior Penalty Function Method – Extrapolation Techniques In The Interior Penalty Function Method – Extended		

Interior Penalty Function Methods.		
UNIT-IV	**DYNAMIC PROGRAMMING**	**9**
Multistage Decision Processes – Types Of Multistage Decision Problems – Concept Of Sub Optimization And Principle Of Optimality – Computational Procedure In Dynamic Programming – Illustrating The Calculus Method Of Solution – Illustrating The Tabular Method Of Solution .		
UNIT-V	**MODERN METHODS OF OPTIMIZATION**	**9**
Genetic Algorithms – Simulated Annealing – Particle Swarm Optimization – Solution Of The Constrained Optimization Problem – Ant Colony Optimization – Optimization Of Fuzzy Systems Neural-Network-Based Optimization – Meta heuristic Optimization Methods – Multilevel And Multi Objective Optimization.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Singiresu S. Rao, "Engineering Optimization: Theory and Practice", John Wiley and Sons, 5th edition, 2019 (Units 1-5) Singiresu S. Rao, "Engineering Optimization: Theory and Practice", John Wiley and Sons, 5th edition, 2019 (Units 1-5)
2	George Bernard Dantzig, Mukund Narain Thapa, "Linear programming", Springer series in operations research 3rd edition, 2003.
REFERENCES:	
1	H.A. Taha, "Operations Research: An Introduction", 8th Edition, Pearson/Prentice Hall, 2007
2	Rao S.S," Optimization – Theory and applications", Wiley Easter Ltd., 1979.
3	David G.Luerbeggan, "Introduction to Linear and Non Linear Programming", Addison Wesley Publishing Co. 1973..
4	Cordan C.C. Beveridge and Robert S. Schedther, "Optimization, Theory and Practice" McGraw Hill Co.1970.
5	Hadley G. "Nonlinear and – dynamic programming" Addison Wesley Publishing Co. 1964

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	2	-
CO2	2	2	2	-	-	-	-	-	1	1	1	2	1	1	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	2	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	2	-
CO5	2	2	-	-	-	-	-	-	2	-	2	2	2	1	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.6**	**2**	**1.6**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT15003	**MULTI CORE COMPUTING**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • Learn the multi core computing and performance measures. • Define the fundamental concepts of parallel programming and its design issues • Understand the concept of Concurrency and Correctness programming • Familiarize common problems in multi-core programming • Gain knowledge in Optimistic Synchronization					
Outcome(s)	**On successful completion of course learner will be able to:** • Identify the limitations of Lower Bounds on the Number of Locations • Demonstrate the problems related to multiprocessing • Solve the issues related to multiprocessing and Hierarchical Locks • Illustrate the salient features of different multi-core architectures and how they exploit parallelism • Implement the concepts of Optimistic Synchronization. **UNIT-I**					
INTRODUCTION TO MULTI CORE COMPUTING						**9**
Shared Objects and Synchronization - A Fable - Mutual Exclusion – Time - Critical Sections – 2 Thread Solutions - Lamport's Bakery Algorithm - Bounded Timestamps - Lower Bounds on the Number of Locations - Concurrent Objects - Concurrency and Correctness - Quiescent Consistency – Linearizability - The Java Memory Model.						
UNIT-II	**FOUNDATIONS OF SHARED MEMORY**					**9**
The Space of Registers - Register Constructions - Atomic Snapshots - The Relative Power of Primitive Synchronization Operations: Consensus Numbers - Consensus Protocols - FIFO Queues - Multiple Assignment Objects - Common2 RMW Operations - The compare And Set() Operation						
UNIT-III	**UNIVERSALITY OF CONSENSUS**					**9**
A Lock-Free Universal Construction - A Wait-Free Universal Construction - Spin Locks and Contention: Test-And-Set Locks - TAS-Based Spin Locks Revisited - Exponential Back off - Queue Locks - A Queue Lock with Timeouts - Hierarchical Locks						
UNIT-IV	**MONITORS AND BLOCKING SYNCHRONIZATION**					**9**
Monitor Locks and Conditions - Readers–Writers Locks - Our Own Reentrant Lock – Semaphores - Linked Lists: The Role of Locking : List-Based Sets - Concurrent Reasoning - Coarse-Grained Synchronization - Fine-Grained Synchronization - Optimistic Synchronization - Lazy Synchronization - Non-Blocking Synchronization						

UNIT-V	COUNTING, SORTING, AND DISTRIBUTED COORDINATION	9
Shared Counting - Software Combining - Quiescently Consistent Pools and Counters - Counting Networks - Diffracting Trees - Parallel Sorting - Sorting Network - Distributed Coordination.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	The Art of Multiprocessor Programming Revised - First Edition Maurice Herlihy, Nir Shavit 2012.
2	Multicore Computing algorithms, Architectures, And Applications Edited By Sanguthevar Rajasekaran, Lance Fiondella, Mohamed Ahmed, Reda A. Ammarcopyright 2014
REFERENCES:	
1	Programming Multi-Core And Many-Core Computing Systems Sabri Pllana, Fatos Xhafa 2017.
2	Multicore and GPU Programming An Integrated Approach 2nd Edition -2022,Gerassimos Barlas.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	3	2	2	-	-	-	-	-	1	1	2	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	3	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	2	2	-
CO5	2	2	-	-	-	-	-	-	2	-	2	2	3	2	-
Average	**2.2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.8**	**2**	**2.6**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15004	**DISTRIBUTED COMPUTING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • Understand the contemporary knowledge in distributed systems. • Familiar with distributed applications. • Learn the performance of distributed synchronization algorithms. • Gain the knowledge about hardware and software issues in modern distributed systems. • Provide basic knowledge in Fault Tolerance Reliable client-server & recovery						
Outcome(s)	**On successful completion of course learner will be able to:** • Explain the basic elements and concepts related to distributed system technologies. • Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware. • Analyze the various techniques used for clock synchronization and mutual exclusion • Demonstrate the concepts of Resource and Process management and synchronization algorithms • Apply the concepts of Consistency and Replication Management.						
UNIT-I	**INTRODUCTION TO DISTRIBUTED SYSTEMS**						**9**
Characterization of Distributed Systems: Issues Goals and Types of distributed systems - Distributed System Models - Hardware concepts - Software Concept - Middleware: Models of Middleware - Services offered by middleware - Client Server model.							
UNIT-II	**COMMUNICATION**						**9**
Layered Protocols – Inter process communication (IPC): MPI - Remote Procedure Call (RPC) - Remote Object Invocation - Remote Method Invocation (RMI) - Message Oriented Communication, Stream Oriented Communication - Group Communication							
UNIT-III	**SYNCHRONIZATION**						**9**
Clock Synchronization - Logical Clocks - Election Algorithms - Mutual Exclusion - Distributed Mutual Exclusion - Classification of mutual Exclusion Algorithm - Requirements of Mutual Exclusion Algorithms - Performance measure.							
UNIT-IV	**RESOURCE AND PROCESS MANAGEMENT**						**9**

Desirable Features of global Scheduling algorithm - Task assignment approach - Load balancing approach - load sharing approach -Introduction to process management - process migration – Threads – Virtualization – Clients – Servers - Code Migration		
UNIT-V	**CONSISTENCY, REPLICATION AND FAULT TOLERANCE**	**9**
Introduction to replication and consistency – Data Centric and Client Centric Consistency Models - Replica Management - Fault Tolerance: Introduction - Process resilience - Reliable client-server and group communication - Recovery		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Andrew S. Tanenbaum and Maarten Van Steen, —Distributed Systems: Principles and Paradigms, 2nd edition, Pearson Education- 2007.
2	George Coulouris, Jean Dollimore, Tim Kindberg, , "Distributed Systems: Concepts and Design", 4th Edition, Pearson Education, 2005.
REFERENCES:	
1	A. S. Tanenbaum and M. V. Steen, "Distributed Systems: Principles and Paradigms", Second Edition, Prentice Hall, 2006.
2	M. L. Liu, —Distributed Computing Principles and Applications‖, Pearson Addison Wesley, 2004.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	1	-
CO2	2	2	2	-	-	-	-	-	1	1	1	2	1	1	-
CO3	3	2	-	-	-	-	-	-	1	1	2	2	-	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	2	-
CO5	2	2	-	-	-	-	-	-	2	1	2	2	2	1	-
Average	**2.2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.4**	**1.6**	**2**	**1.4**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15005	**GREEN COMPUTING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • Learn the fundamentals of Green Computing. • Acquire knowledge to adopt green computing practices to minimize negative impacts on the environment. • Know the Green computing Grid Framework. • Understand the issues related with Green compliance. • Study and develop various case studies.						
Outcome(s)	**Upon completion of this course-the student will be able to do** • Describe the fundamentals of Green Computing. • Summarize the concept of green computing practices to minimize negative impacts on the environment. • Analyze the Green computing Grid Framework. • Evaluate technology tools that can reduce paper waste and carbon footprint by the stakeholders. • Demonstrate the ways to minimize equipment disposal requirements						
UNIT-I	**FUNDAMENTALS**						**9**
Green IT Fundamentals: Business, IT and the Environment –Green computing: carbon foorprint, scoop on power – Green IT Strategies: Drivers, Dimensions, and Goals- Environmentally Responsible Business: Policies, Practices and Metrics.							
UNIT-II	**GREEN ASSETS AND MODELING**						**9**
Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration– Green Enterprise Architecture– Environmental Intelligence–Green Supply Chains– Green Information Systems: Design and Development Models.							
UNIT-III	**GRID FRAMEWORK**						**9**
Virtualization of IT systems – Role of electric utilities, Telecommuting, teleconferencing and teleporting –Materials recycling –Best ways for Green PC –Green Data center –Green Grid framework.							

UNIT-IV	GREEN COMPLIANCE	9
Socio-cultural aspects of Green IT – Green Enterprise Transformation Roadmap – Green Compliance: Protocols, Standards, and Audits–Emergent Carbon Issues: Technologies and Future.		
UNIT-V	**CASE STUDIES**	**9**
The Environmentally Responsible Business Strategies(ERBS)–Case Study Scenarios for Trial Runs –Case Studies–Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	BhuvanUnhelkar-"GreenITStrategiesandApplications–UsingEnvironmentalIntelligence"-CRCPress-June2011
2	WoodyLeonhard-KatherineMurray-"GreenHomeComputingForDummies"-August2009
REFERENCES:	
1	AlinGales-MichaelScheafer-MikeEbbers-"GreenDataCenter:StepsForTheJourney" Shoff/IBMRebook-2011
2	John Lamb- "The Greening of IT"-PearsonEducation-2009
3	JasonHarris-"GreenComputingandGreenIT-BestPracticesonRegulations&Industry"-Lulu.com-2008
4.	Carl Speshocky- "Empowering Green Initiatives With IT"-JohnWiley&Sons-2010

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	2	-	-	-	-	-	-	-	1	1	2	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	-	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	2	2	-
CO5	2	2	1	-	-	-	-	-	2	-	2	2	1	2	-
Average	**2**	**1.4**	**1**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.8**	**2**	**1.6**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE(Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
22IT15006	**VIRTUALIZATION TECHNIQUES**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To understand the concept of Virtualization concepts • To study the Virtualized Operating system. • To understand the concept of virtualization storage • To study the technologies of network virtualization • To study the virtual machine products						
Outcome(s)	**Upon completion of the course, the students should be able to:** • Identify the need of virtualization infrastructure. • Create OS level virtualization. • Identify storage level virtualization. • Analyze network level virtualization. • Compare and analyze various virtual machines products						
UNIT-I	**INTRODUCTION**						**9**
Architect for virtualization-virtualization–five step process–Discovery–Hardware maximization–Architectures–Manage virtualization-Build the resource pool–planning and preparation–network layer–storage–host servers–testing-levels.							
UNIT-II	**OS VIRTUALIZATION**						**9**
Hardware level virtualization – OS level Virtualization–Interception Technique on windows–Feather weight Virtual Machine-FVM states-operations–Design of virtualization layer– Implementation–System call log analysis–Limitations of FVM.							
UNIT-III	**STORAGE VIRTUALIZATION**						**9**
Storage virtualization–Enhanced Storage and Data Services–Implementation–High Availability–Performance–Capacity–SNIA storage management–Policy based service level management– Future Of storage virtualization.							
UNIT-IV	**NETWORK VIRTUALIZATION**						**9**
Key Concepts-Architecture–Virtualized network Components-Logical Networks-Logical Network Design-Naming Conventions-Port profiles-up link port profiles–network adapter port profiles–Logical switches-planning logical switch design-deployment–Operations.							
UNIT-V	**VIRTUAL MACHINES PRODUCTS**						**9**
Xen Virtual machine monitors-Xen API–VMware–VMware products-Vmware Features–Microsoft Virtual Server–Features of Microsoft Virtual Server.							
						TOTAL HOURS	**45**

TEXTBOOKS:	
1	Matthew portnoy, "Virtualization Essentials" ,SYBEX (Wiley Brand)2nd Edition,2016.
2	Yang Yu, "OS-level Virtualization and Its Applications" ,Pro Quest LLC,2009.
3	FrankBunn,NikSimpson,RobertPeglar,GeneNagle,"TechnicalTutorial–Storage Virtualization", Storage Networking Association(SNIA),2004.
REFERENCES:	
1	Danielle Ruest, Nelson Ruest, "Virtualization: A Beginner's Guide",McGraw-Hill,2009.
2	Nigel Cain, Alvin Morales, Michel Luescher, Damian Flynn Mitch Tulloch, "Microsoft System Center-Building a virtualized Network Solution" ,Microsof tpress,2004.
3	Matthew Portney, "Virtualization Essentials" ,John Wiley&Sons,2012.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	3	2	-
CO4	2	1	-		-	-	-	-	2	2	1	2	2	2	-
CO5	3	2	2	-	-	-	-	-	2	-	2	2	3	2	-
Average	**2.2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.2**	**1.8**	**2.6**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
22IT15007	**WEB DEVELOPMENT FRAMEWORKS**	**L**	**T**	**P**	**C**	**100**
		3	**0**	**0**	**3**	
Objective(s)	**The student should be made to:** • To understand the fundamentals of web framework • To know the concept of Java web framework • To learn the technologies of Python web framework • To be familiar to the concepts of Web framework• To know about MVC Architecture • To be familiar with web framework					
Outcome(s)	**Upon completion of the course, the students should be able to:** • Analyze the fundamentals of web framework • Summaries the concept of Java web framework • Implement the concept using Struts framework • Apply the concept of python web framework to the problem solutions. • Analyze the various Web frameworks.					
UNIT-I	**FUNDAMENTALS OF WEB FRAMEWORK**					**9**
Web framework-History-Types of framework architectures-Model–view–controller (MVC)-Three-tier organization-Introduction to frameworks-Framework applications-General-purpose website frameworks-Server-side-Client-side-Features.						
UNIT-II	**JAVA WEB FRAMEWORK**					**9**
Java Web Frameworks-Struts-The Struts Framework- The Struts Tag Libraries- - Struts Configuration Files-Applying Struts.						
UNIT-III	**STRUTS2**					**9**
Struts and Agile Development-Basic Configuration.- Actions and Action Support.-Results and Result Types.-OGNL, the Value Stack, and Custom Tags-Form Tags- Form Validation and Type Conversion-Exceptions and Logging-Getting Started with JavaScript-Advanced JavaScript, the DOM, and CSS-Themes and Templates-Rich Internet Applications.						
UNIT-IV	**PYTHON WEB FRAMEWORKS**					**9**
Introduction to Python Frameworks-Web2.0,Python ,and Frameworks-The Role of AJAX in Web 2.0 - Web 2.0 with Traditional Python – Introducing the Frameworks - Web Application Frameworks- MVC in Web Application Framework Common Web Application Framework Capabilities.						

UNIT-V	TURBO GEARS WEB FRAMEWORK	9
Introduction to Turbo Gears-Turbo Gears History-Main Turbo Gears Components-Alternate Components-MVC Architecture in Turbo Gears- Creating an Example Application-The Controller and View-Introduction to Django - Django History- Django Components-Alternate Components-MVC Architecture in Django-Creating an Example Application		
	TOTAL HOURS	**45**

TEXTBOOKS:	
1	James Holmes, Struts The Complete Reference2nd Edition, Mc.Graw Hill Professional 2006
2	Donald Brown, Chad Michael Davis, Scott Stanlick Struts2 In Action Dream tech press 2008
REFERENCES:	
1	Sue Spielman,The Struts Framework1:A Practical guide for Java Programmers,1st Edition. Elsevier 2002
2	Adrian Holovaty,Jacob Kaplan-Moss,—The Definitive Guideto Django: Web Development
3	Mark Ramm, Rapid Web applications with Turbo Gears, Prentice Hall.2009
4	Dana Moore,Raymond Budd,William Wright,—Professional Python Frameworks Web2.0 John wiley &sons,2008

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	3	2	1	2	-
CO2	2	2	2	-	-	-	-	-	1	1	3	2	2	1	-
CO3	2	2	-	-	-	-	-	-	1	1	3	1	1	2	-
CO4	2	1	2		-	-	-	-	2	2	3	2	1	1	-
CO5	2	2	-	-	-	-	-	-	2	-	3	1	2	1	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**3**	**1.6**	**1.4**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRAENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT15008	**INFORMATION RETRIEVAL TECHNIQUES**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • Study the basics of Information Retrieval. • Understand machine learning techniques for text classification and clustering. • Know the clustering and searching techniques for different data base system. • Acquire the knowledge about various search engine system operations. • Learn different techniques of recommender system.					
Outcome(s)	**Upon completion of the course, the students will be able to:** • Apply an open source search engine framework and explore its capabilities • Apply appropriate method of classification or clustering. • Evaluate the performance of information retrieval system • Design and implement innovative features in a search engine. • Illustrate the concepts of recommender system with different models.					
UNIT-I	**INTRODUCTION**					9
Information Retrieval – Early Developments – The IR Problem – The User_s Task – Information versus Data Retrieval - The IR System – The Software Architecture of the IR System – The Retrieval and Ranking Processes - The Web – The e-Publishing Era – How the web changed Search – Practical Issues on the Web – How People Search – Search Interfaces Today – Visualization in Search Interfaces.						
UNIT-II	**MODELING AND RETRIEVAL EVALUATION**					9
Basic IR Models - Boolean Model - TF-IDF (Term Frequency/Inverse Document Frequency) Weighting - Vector Model – Probabilistic Model – Latent Semantic Indexing Model – Neural Network Model – Retrieval Evaluation – Retrieval Metrics – Precision and Recall – Reference Collection – User-based Evaluation – Relevance Feedback and Query Expansion – Explicit Relevance Feedback						

UNIT-III	TEXT CLASSIFICATION AND CLUSTERING	9
A Characterization of Text Classification – Unsupervised Algorithms: Clustering – Naïve Text Classification – Supervised Algorithms – Decision Tree – k-NN Classifier – SVM Classifier – Feature Selection or Dimensionality Reduction – Evaluation metrics – Accuracy and Error – Organizing the classes – Indexing and Searching – Inverted Indexes – Sequential Searching – Multidimensional Indexing		
UNIT-IV	**WEB RETRIEVAL AND WEB CRAWLING**	9
The Web – Search Engine Architectures – Cluster based Architecture – Distributed Architectures – Search Engine Ranking – Link based Ranking – Simple Ranking Functions – Learning to Rank – Evaluations -- Search Engine Ranking – Search Engine User Interaction – Browsing – Applications of a Web Crawler – Taxonomy – Architecture and Implementation – Scheduling Algorithms – Evaluation.		
UNIT-V	**RECOMMENDER SYSTEM**	9
Categorization and Clustering – Categorization Algorithms – Naive Bayes – Decision Trees and Nearest Neighbor – Clustering Algorithms – Agglomerative Clustering – k Means – Expectation Maximization (EM) – Applications to Information Filtering – Organization and Relevance Feedback.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Ricardo Baeza-Yates and Berthier Ribeiro-Neto, —Modern Information Retrieval: The Concepts and Technology behind Search, Second Edition, ACM Press Books, 2011.
2	Ricci, F, Rokach, L. Shapira, B.Kantor, —Recommender Systems Handbook, First Edition, 2011.
REFERENCES:	
1	C. Manning, P. Raghavan, and H. Schütze, —Introduction to Information Retrieval, Cambridge University Press, 2008
2	Stefan Buettcher, Charles L. A. Clarke and Gordon V. Cormack, —Information Retrieval: Implementing and Evaluating Search Engines, The MIT Press, 2010.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	2	-
CO2	2	2	2	-	-	-	-	-	1	1	1	2	1	1	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	2	1	-
CO4	2	1	2		-	-	-	-	2	2	1	1	1	2	-
CO5	2	2	-	-	-	-	-	-	2	-	2	2	2	1	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.6**	**1.6**	**1.6**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Periods/week**			**Credit**	**Maximum marks**	
		L	**T**	**P**	**C**		
22IT15009	**OPEN SOURCE SOFTWARE**	3	0	0	3	**100**	
Objective(s)	**The student should be made to:** • Understand the overview of open source software and platforms. Know about the Pearl language overview. Know about the PHP Programming in web environment. Learn about R Programming. Learn about back end connectivity.						
Outcome(s)	**The students will be able to:** • Explain the importance of open source software and platforms. Apply the Pearl parsing rules in open source software. Demonstrate the PHP programming in web environment. Apply R programming concepts in open source software. Implement back end connectivity in different open source tools.						
UNIT-I	**INTRODUCTION**					9	
Introduction to Open Sources: Need of Open SourcesAdvantages of Open Sources-Applications of Open sources. **Open Source Operating System:** LINUX: Introduction General Overview-Kernel Mode and user mode-Process. **Advanced Concepts:** Scheduling-Personalities-Cloning Signals-Development with Linux.							
UNIT-II	**OPENSOURCE PROGRAMMINGLANGUAGES-I**					9	
Perl back ground–Perl overview –Perl parsing rules–Variables and Data–Statements and Control structures–Subroutines,Packages ,and Modules-Working with Files–Data Manipulation.							
UNIT-III	**PROGRAMMINGLANGUAGES-II**					9	
PHP: Introduction – Programming in web environment – variables –constants – data type - operators– Statements–Functions–Arrays–OOP–String Manipulation and regular expression– File handling and data storage– PHP and SQL database– PHP and LDAP– PHP Connectivity– Sending and receiving E-mails–Debugging and error handling– Security–Templates. .							
UNIT-IV	**PROGRAMMINGLANGUAGES-III**					9	
R programming: History and Overview of R: Basic Features of R-Free Software-Design of the RSystem.R Nuts and Bolts: Entering Input – Evaluation- RObjects- Numbers- Creating Vectors-Matrices-Factors-Data Frames-Names.Getting Data In and Out of R-File Connections- Vectorized Operations-Control Structures-Functions.							

UNIT-V	DATABASE CONNECTIVITY – MySQL	9
Connecting to MySQL – Queries – Fetching Data Sets – Data About Data – Multiple Connections – Creating MySQL Databases with PHP – MySQL Functions – HTML Tables and Database Tables – Complex Mappings – Creating the Sample Tables.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Ellen Siever,Stephen Figgins,Robert Love,Arnold Robbins,"Linux in a Nutshell",Sixth Edition,Oreilly Media,2009.
2	Roger P D eng,"R programming for DataScience",First Edition,2015.
REFERENCES:	
1	Steven Holzner,"PHP:The Complete Reference",2nd Edition,Tata McGraw-Hill Publishing Company Limited, Indian Reprint 2009.
2	Philosophy of GNU URL:http://www.gnu.org/philosophy/.
3	Linux Administration URL:http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/.
4	The Python Tutorial available at http://docs.python.org/2/tutorial/.Elsevier,Second Edition.
5	Perl Programming book at http://www.perl.org/books/beginning-perl/.
6	R programming book at http://leanpub.com/rprogramming
7	Version control system URL:http://git-scm.com/. Samba:URL:http://www.samba.org/.and Libre office:http://www.libreoffice.org/.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	2	1	2	-	-	-	-	-	1	1	2	2	3	1	-
CO3	2	2	1	-	-	-	-	-	1	1	2	2	3	2	-
CO4	2	1	1		-	-	-	-	2	2	2	2	3	1	-
CO5	2	2	2	-	-	-	-	-	2	-	2	2	3	2	-
Average	**2**	**1.6**	**1.6**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**2**	**2**	**3**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
		L	**T**	**P**	**C**		
22IT15010	**AGILE METHODOLOGIES**	3	0	0	3	**100**	
Objective(s)	The student should be made to: Understanding about the Agile principle Know about the rules of Scrum and Self-Organizing Teams. Understand about the Scrum Planning and Collective Commitment. Gain knowledge about XP principles. Learn about the concept of Lean, Kanban and Agile Coach.						
Outcome(s)	Upon completion of this course, students will be able to Apply agile's core values and principles Use the scrum's emphasis on project management and self-organization Experiment with practices like user stories, story points, project velocity and visualization tools. • Model software design and architecture with XP practices like pair programming. • make use of Lean thinking to empower a team, eliminate waste, and deliver software fast and Learn how Kanban's practices help deliver great software by managing flow						
UNIT-I	Agile Principles						**9**
Understanding the Agile Values – Silver Bullet Methodology – Agile to the Rescue – A fractured perspective - Agile Manifesto and Purpose behind each practice – Agile Elephant – Where to start with a new Methodology – 12 principles of Agile Software – The Customer is always Right – Delivering the project – Communicating and Working Together – Project Execution – Constantly improving the project and t he team – Agile Project.							
UNIT-II	Scrum and Self-Organizing Teams						**9**
Scrum and Self-Organizing Teams : Basic pattern for a Scrum Project – Rules of Scrum –Command-and-Control Team – Self Organizing Teams - Scrum Values – Daily Scrum – Sprints, Planning and Retrospectives.							
UNIT-III	Scrum Planning and Collective Commitment:						**9**
Scrum Planning and Collective Commitment: User stories – Conditions of Satisfaction – Story Points and Velocity – Burn down Charts – Planning and Running a Sprint – GASP – Scrum Values Revisited – Practices Do Work Without the Values – Company Culture Compatible with Scrum Values							
UNIT-IV	XP and Incremental Design						**9**

XP and Incremental Design: Primary Practices of XP – The XP values help the team change their mindset – An effective mindset starts with the XP values – Understanding the XP principles – Feedback Loops – Code and Design – Make Code and Design Decisions at the Last Responsible Moments – Incremental Design and the Holistic XP.		
UNIT-V	Lean, Kanban and Agile Coach	**9**
Lean, Kanban and Agile Coach: Lean Thinking – Commitment, Options Thinking and Set Based Development – Create Heroes and Magical Thinking – Eliminate Waste – Value Stream Map – Deliver As Fast As Possible – WIP Area Chart – Pull Systems – The Principles of Kanban – Improving Your Process with Kanban – Measure and Manage Flow – Little's Law – Emergent Behavior with Kanban – The Agile Coach – Shuhari - The Principles of Coaching.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Andrew Stellman and Jennifer Greene, "Learning Agile: Understanding Scrum, XP, Lean and Kanban", Edition, O'Reilly Media, 2015.
REFERENCES:	
1	Robert C. Martin, "Agile Software Development: Principles, Patterns, and Practices", 1 Edition, Pearson Prentice Hall, 2011.
2	Eric Brechner, "Agile Project Management with Kanban", 1 Edition, Microsoft Press, 2015.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	2	1	1	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	2	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	2	-
CO5	2	2	1	-	-	-	-	-	2	-	2	2	2	1	-
Average	**2**	**1.6**	**1.4**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.6**	**1.8**	**1.6**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRAENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
22IT15011	**DevOps**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To introduce DevOps terminology, definition & concepts. • To understand the different Version control tools like Git, Mercurial. • To understand the concepts of Continuous Integration/ Continuous Testing/ ContinuousDeployment). • To understand Configuration management using Ansible. • Illustrate the benefits and drive the adoption of cloud-based Devops tools to solve realworld problems.						
Outcome(s)	**Upon completion of the course, the students will be able to:** • Understand different actions performed through Version control tools like Git. • Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle. • Ability to Perform Automated Continuous Deployment • Ability to do configuration management using Ansible • Understand to leverage Cloud-based DevOps tools using Azure DevOps						
UNIT-I	**INTRODUCTION TO DEVOPS**					9	
Devops Essentials - Introduction To AWS, GCP, Azure - Version control systems: Git and Github.							
UNIT-II	**COMPILE AND BUILD USING MAVEN & GRADLE**					9	
Introduction, Installation of Maven, POM files, Maven Build lifecycle, Build phases(compile build, test, package) Maven Profiles, Maven repositories(local, central, global),Maven plugins, Maven create and build Artificats, Dependency management, Installation of Gradle, Understand build using Gradle.							
UNIT-III	**CONTINUOUS INTEGRATION USING JENKINS**					9	
Install & Configure Jenkins, Jenkins Architecture Overview, Creating a Jenkins Job, Configuring a Jenkins job, Introduction to Plugins, Adding Plugins to Jenkins, Commonly used plugins (Git Plugin, Parameter Plugin, HTML Publisher, Copy Artifact and Extended choice parameters). Configuring Jenkins to work with java, Git and Maven, Creating a Jenkins Build and Jenkins workspace.							

UNIT-IV	**CONFIGURATION MANAGEMENT USING ANSIBLE**	9
Ansible Introduction, Installation, Ansible master/slave configuration, YAML basics, Ansible modules, Ansible Inventory files, Ansible playbooks, Ansible Roles, adhoc commands in ansible		
UNIT-V	**BUILDING DEVOPS PIPELINES USING AZURE**	9
Create Github Account, Create Repository, Create Azure Organization, Create a new pipeline, Build a sample code, Modify azure-pipelines.yaml file.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Roberto Vormittag, "A Practical Guide to Git and GitHub for Windows Users: From Beginner to Expert in Easy Step-By-Step Exercises", Second Edition, Kindle Edition, 2016.
2	Jason Cannon, "Linux for Beginners: An Introduction to the Linux Operating System and Command Line", Kindle Edition, 2014
REFERENCES:	
1	Hands-On Azure Devops: Cicd Implementation For Mobile, Hybrid, And Web Applications Using Azure Devops And Microsoft Azure: CICD Implementation for ... DevOps and Microsoft Azure (English Edition) Paperback – 1 January 2020
2	Jeff Geerling, "Ansible for DevOps: Server and configuration management for humans", First Edition, 2015.
3	David Johnson, "Ansible for DevOps: Everything You Need to Know to Use Ansible for DevOps", Second Edition, 2016.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	2	-
CO2	2	2	2	-	-	-	-	-	1	1	1	2	1	1	-
CO3	2	2	-	-	-	-	-	-	2	1	2	1	-	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	-	-
CO5	2	2	-	-	-	-	-	-	2	-	2	2	2	1	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.8**	**1.2**	**1.6**	**2**	**1.2**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT15012	**SOFTWARE TESTING**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • Study the fundamentals of software testing based on activity. • Gain knowledge about the test case design strategies based on different test methods. • Understand the different levels of testing. • Be familiar with test management and test automation techniques. • Be exposed to test metrics and measurements
Outcome(s)	**Upon completion of this course , students will be able to** • Design test cases suitable for a software development for different domains. • Identify suitable tests to be carried out. • Prepare test planning based on the document. • Document test plans and test cases designed. • Use of automatic testing tools. Develop and validate a test plan.

UNIT-I	**INTRODUCTION**	**9**
Testing as an Engineering Activity- Testing as Process - Testing axioms - Basic definitions - Software Testing Principles - The Testers Role in a Software Development Organization - Origins of Defects - Cost of defects - Defect Classes - The Defect Repository and Test Design - Defect Prevention strategies.		
UNIT-II	**TEST CASE DESIGN**	**9**
Test case Design Strategies – Using Black Box Approach to Test Case Design – Random Testing – Requirements based testing – Boundary Value Analysis – Equivalence Class Partitioning – State-based testing – Cause-effect graphing – Compatibility testing – user documentation testing – domain testing – Using White Box Approach to Test design – static testing vs. structural testing- code functional and complexity testing – Coverage and Control Flow Graphs – Covering Code Logic – Paths complexity testing – Evaluating Test Adequacy Criteria.		
UNIT-III	**LEVELS OF TESTING**	**9**
The need for Levers of Testing – Unit Test – Unit Test Planning – Designing the Unit Tests – Running the Unit tests and Recording results – Integration tests – Designing and Planning the Integration Test – Scenario testing –System Testing – Acceptance testing – Performance testing – Regression Testing – Internationalization testing – Ad-hoc testing – Alpha, Beta Tests- Configuration testing – Compatibility testing.		

UNIT-IV	TEST MANAGEMENT	9
People and organizational issues in testing – Organization structures for testing teams – testing services – Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – Test Process – Reporting Test Results – The role of three groups in Test Planning and Policy Development - Introducing the test specialist – Skills needed by a test specialist –Building a Testing Group.		
UNIT-V	**TEST AUTOMATION**	**9**
Software Test Automation – Skill needed for automation – Scope of automation – Design and architecture for automation – Requirements for a test tool – Challenges in automation – Test metrics and measurements – Project, progress and productivity metrics.		
	TOTAL HOURS	**45**

TEXT BOOKS :	
1.	Srinivasan Desikan and Gopalaswamy Ramesh, "Software Testing – Principles and Practices", Pearson Education, 2013.
2.	Ron Patton, "Software Testing", Second Edition, Sams Publishing, Pearson Education, 2007.
REFERENCES:	
1	Ilene Burnstein, " Practical Software Testing", Springer International Edition, 2003.
2	Edward Kit," Software Testing in the Real World – Improving the Process", Pearson Education, 2001.
3	Boris Beizer," Software Testing Techniques" – 2nd Edition, Van Nostrand Reinhold, New York, 1990.
4	Aditya P. Mathur, "Foundations of Software Testing _ Fundamental Algorithms and Techniques", Dorling Kindersley (India) Pvt. Ltd., Pearson Education, 2008.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	1	1	2	-
CO2	2	2	2	-	-	-	-	-	1	1	1	1	1	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	1	2	-
CO4	2	1	2		-	-	-	-	2	2	1	1	1	2	-
CO5	2	2	-	-	-	-	-	-	2	-	1	1	1	2	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.4**	**1.2**	**1**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
22IT15013	**C# and .NET AND FRAMEWORK**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	• **Learn the C# language basics.** • **Understand the advanced features of C#.** • **Know about the base class libraries and data manipulation.** • **Have knowledge about window and web based applications** • **Gain knowledge about applications using .Net Compact Framework.**						
Outcome(s)	• Explain the difference between C # and Java framework. • Work with the basic and advanced features of C# language. • Create applications using various data providers. • Create web application using ASP.NET. • Create mobile application using .NET compact framework.						
UNIT-I	**C# LANGUAGE BASICS**						9
.Net Architecture – Core C# – Variables – Data Types – Flow control – Objects and Types- Classes and Structs – Inheritance- Generics – Arrays and Tuples – Operators and Casts – Indexers Assemblies – Shared Assemblies – CLR Hosting – App domains.							
UNIT-II	**C# ADVANCED FEATURES**						9
Delegates – Lambdas – Lambda Expressions – Events – Event Publisher – Event Listener – Strings and Regular Expressions – Generics – Collections – Memory Management and Pointers – Errors and Exceptions – Reflection.							
UNIT-III	**BASE CLASS LIBRARIES AND DATA MANIPULATION**						9
Diagnostics Tasks – Threads and Synchronization – Manipulating XML – SAX and DOM – Manipulating files and the Registry – Transactions – Data access with ADO.NET: Introduction, LINQ to Entities and the ADO.NET Entity Framework, Querying a Database with LINQ – Creating the ADO.NET Entity Data Model Class Library, Creating a Windows Forms Project – Data Bindings Between Controls and the Entity Data Model – Dynamically Binding Query Results							
UNIT-IV	**WINDOW AND WEB BASED APPLICATIONS**						9
Window Based Applications – Core ASP.NET – ASP.NET Web Forms – Server Controls, Data Binding – ASP.NET State Management, Tracing, Caching, Error Handling, Security, Deployment, User and Custom Controls – Windows Communication Foundation (WCF) – Introduction to Web Services.							

UNIT-V	.NET COMPACT FRAMEWORK	9
Reflection – .Net Remoting-.Net Security – Localization – Peer-to-Peer Networking – Building P2P Applications – .Net Compact Framework – Compact Edition DataStores – Testing and Debugging – Optimizing performance – Packaging and Deployment.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Herbert Schildt, "The Complete Reference: C# 4.0", Tata McGraw Hill, 2012.
2	Christian Nagel et al. "Professional C# 2012 with .NET 4.5",Wiley India, 2012.
REFERENCES:	
1	Christian Nagel, Bill Evjen, Jay Glynn, Karli Watson, Morgan Skinner, "Professional C# and .NET 4.5", Wiley, 2012.
2	Andrew Troelsen, "Pro C# 5.0 and the .NET 4.5 Framework", Apress publication, 2012.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	1	2	3	2	1	2	-
CO2	2	2	2	-	-	-	-	-	1	1	3	1	2	2	-
CO3	2	2	-	-	-	-	-	-	-	1	3	1	1	2	-
CO4	2	1	2		-	-	-	-	1	2	3	2	1	2	-
CO5	2	2	-	-	-	-	-	-	2	-	3	1	1	2	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1**	**1.2**	**3**	**1.4**	**1.2**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr. S. Raju

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Information Technology**	**Programme Code**	**2071**

Program Elective

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT15014	**ADVANCED JAVA PROGRAMMING**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • Learn the concepts of interfaces, threads, and swings using Java. • Learn how to establish network connectivity and write socket programming in Java. • Familiar to develop client side programming in Java. • Familiar to develop server side programming in Java. • Learn how to handle data from databases in java.
Outcome(s)	**At the end of the course, the students should be able to:** • Explain the main concepts of interfaces, threads and swings in Java • Describe network connectivity using sockets and share data across networks • Develop client side programs in Java. • Develop server side programs in Java. • Create applications using java and perform data handling operations in database

UNIT-I	**JAVA FUNDAMENTALS**	**9**

Java I/O streaming – filter and pipe streams – Byte Code interpretation - Threading – Swing.

UNIT-II	**NETWORK PROGRAMMING IN JAVA**	**9**

Sockets – secure sockets – custom sockets – UDP datagrams – multicast sockets – URL classes – Reading Data from the server – writing data – configuring the connection – Reading the header – telnet application – Java Messaging services

UNIT-III	**CLIENT SIDE PROGRAMMING**	**9**

Client- Server computing – Sockets – Content and Protocols handlers – Developing distributed applications –RMI – Remote objects – Object serialization

UNIT-IV	**SERVER SIDE PROGRAMMING**	**9**

Introduction to Java Servlets – Overview and Architecture – Handling HTTP get &post request – Session Tracking – Multi-tier application - Implicit objects –Scripting – Standard actions – Directives – Custom Tag libraries

UNIT-V	JAVA DATABASE PROGRAMMING	9
Connecting to Databases – JDBC principles – Databases access – Interacting –Database search – Accessing Multimedia databases – Database support in Web applications.		
	TOTAL HOURS	**45**

TEXT BOOK :

	Herbert Schildt, “Java The Complete Reference”, McGraw-Hill Publications,2011
22	Elliotte Rusty Harold, “Java Network Programming”, O’Reilly publishers, 2004
333	Hortsmann& Cornell, “CORE JAVA 2 ADVANCED FEATURES, VOL II”, Pearson Education, 2002.

REFERENCES:

1	Kogent solution Inc, “Java 6 Programming Black Book”, Dreamtech press ,2007
2	Deital and Deital, Goldberg, “Internet &World Wide Web, How To Program”. Fourth Edition, Prentice Hall, 2009
3	Deitel M. and Deitel P.J., “Java how to program”, Prentice Hall, Eighth Edition, 2009.
4	Cay.S.Horstmann, Gary Cornell, “ Core Java Volume –II Advanced Features”,Prentice Hall, Eighth Edition, 2008.
5	Campione, Walrath and Huml, “The Java Tutorial”, Addison Wesley, 2003.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	3	-	-	-	-	-	-	-	-	1	2	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	1	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	2	1	-
CO5	2	2	1	-	-	-	-	-	-	-	2	2	1	1	-
Average	**2.2**	**1.4**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**1.2**	**1.8**	**2**	**1.8**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
Program Elective							
Course code	**Course Name**	**Hours/week**				**Credit**	**Maximum Marks**
		L	**T**	**P**		**C**	
22IT15015	**SOFTWARE PROJECT MANAGEMENT**	3	0	0		3	**100**
Objective(s)	**The student should be made to:** • Learn the basic of software project management and the project planning • Understand and assess the projects and to find the cost of the project using cost benefit evaluation techniques • Know about the techniques for software cost estimation and activity planning • Familiar with there is involved in the project and the appropriate strategies form of potential risks • Gain knowledge about project planning activities that accurately forecast project costs, timelines, and quality.						
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the Project Management principles while developing software • Elaborate in detail about the project management concepts, framework and the process models • Demonstrate the software process models and software effort estimation techniques • Determine the check points ,reporting structure, progress and tracking mechanisms of project using project management principles. • Summarize the role of people involved in project management.						
UNIT-I	**INTRODUCTION**						9
Software projects versus other types of project - Contract management and technical project management-Plans, methods and methodologies-categorizing software projects-Stakeholders-The business case- Requirement specification-Management control-Step Wise project planning.							
UNIT-II	**PROJECTEVALUATION**						9
Strategic assessment-Technical assessment-Cost–benefit analysis-Cash flow forecasting-Cost–benefit evaluation techniques- Risk evaluation.							
UNIT-III	**SOFTWAREPROJECTAPPROACH**						9
Choosing technologies-Technical plan contents list-The waterfall model-The V process model- The spiral model-Software prototyping-Incremental delivery-Dynamic Systems Development Method-Extreme programming.							

UNIT-IV	RISKMANAGEMENTANDMONITORING	9
Introduction-The nature of risk-Types of risk-Managing risk-Hazard identification–Hazard analysis-Risk planning and control-Evaluating risks to the schedule-Creating the framework – Collecting the data- Visualizing progress- Cost monitoring- Earned value-Prioritizing monitoring- Getting the project back to target-Change control Types of contract- Stages in contract placement- Typical terms of a contract-Contract management–Acceptance.		
UNIT-V	**MANAGING PEOPLE**	9
Introduction – Understanding Behaviour – Organizational Behaviour: A Background – Selecting The Right Person For The Job – Instruction in the best methods – Motivation – The Oldham–Hackman Job Characteristics Model – Stress – Health and Safety. Working in Teams: Introduction – Becoming A Team – Decision Making– Organizational & Team Structures – Coordination Dependencies – Dispersed and virtual teams – Communication Generes – Communication Plans – Leadership.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Bob Hughes, Mike Cotterell and Rajib Mall:Software Project Management – Fifth Edition, Tata Mc Graw Hill,New Delhi, 2012.
REFERENCES:	
1	Robert K.Wysocki-Effective Software Project Management–Wiley Publication,2011
2	Walker Royce:-Software Project Management‖-Addison-Wesley,1998
3	Gopalaswamy Ramesh, ―Managing Global Software Projects– McGraw Hill Education (India),Fourteenth Reprint 2013.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	1	2	2	2	2	-
CO2	3	-	-	-	-	-	-	-	1	1	1	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	1	1	-
CO4	2	1	2		-	-	-	-	2	2	1	1	2	1	-
CO5	2	2	1	-	-	-	-	-	2	-	1	2	2	2	-
Average	**2.2**	**1.4**	**1**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1**	**1.4**	**1.6**	**1.8**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
22IT15016	**MODELING AND SIMULATION**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The students should be made to:** • Learn about basis Modeling Process • Have knowledge about new ideas in Dynamics Models • Familiar with the basic Simulations of Data Driven Models • Understand the concepts of Cellular Automation • Expertise with the logic of a real system by using statistical descriptions						
Outcome(s)	**Upon completion of this course, students will be able to** • Discuss the Model system dynamics with and without constraints • Construct models for systems with interactions • Explain the use of randomness and data for modeling • Illustrate the cellular automation for modeling natural processes and explain concurrent processing and parallel algorithms • Apply matrix theory in problem solving						
UNIT-I	**MODELING PROCESS**						9
Classification of modeling – Steps of modeling – System Dynamics: Unconstrained Growth and Decay - Constrained Growth – Drug Dosage – Force and Motion: Modeling Falling and Sky diving.							
UNIT-II	**SYSTEM DYNAMICS MODELS**						9
Competition – Modeling of Competition – Predator – Prey Model – Modeling the spread of SARS – SIR Model– SAR Model –Enzyme Kinetics – Enzymatic Reactions.							
UNIT-III	**DATA DRIVEN MODELS**						9
Functions – Empirical Models – Simulating with Randomness: Simulations – Random numbers from various distributions – Random Walk.							
UNIT-IV	**CELLULAR AUTOMATION**						9
Diffusion – Spreading of Fire – Periodic Boundary Conditions – Movement of Ants – Formulating a Model - High Performance Computing: Concurrent Processing – Parallel Algorithms.							

UNIT-V	MATRIX MODELS	9
Matrices for Population Studies – Population Matrices and High-Performance Computing -Time after Time – Age - Structured Model- Modeling with Markov Chains- Problems from Psychology to Genetics		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Angela B. Shiflet, George W. Shiflet, "Introduction to Computational Science: Modelling and Simulation for the Sciences",2nd Edition, Princeton University Press, 2014. (Units 1-5)
REFERENCES:	
1	Zeigler B.P. Praehofer. H. and Kim I.G. "Theory of modeling and simulation", 2 nd Edition. Academic press 2000
2	Ogata K " Modern control Engineering" 3 rd edition. Prentice hall of India 2001
3	Pratab.R " Getting started with MATLAB" Oxford university Press 2009

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	1	2	2	-
CO2	2	2	2	-	-	-	-	-	1	1	1	2	1	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	2	1	-
CO4	2	1	2		-	-	-	-	2	2	1	1	1	2	-
CO5	2	2	-	-	-	-	-	-	2	-	1	-	-	2	-
Average	**2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.4**	**1**	**1.2**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRAENGINEERINGCOLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**			**Programme Code**		**2071**	
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT150017	**DATA WAREHOUSING AND DATAMINING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The students will be made to** • Understand data warehouse concepts, architecture, business analysis and tools. • Learn the data pre-processing and data visualization techniques. • Know the algorithms for finding hidden and interesting patterns in data. • Understand and apply various classification and clustering techniques using tools. • Be familiar about heuristic search techniques.						
Outcome(s)	**The students will be able to** • Explain Data warehouse system and perform business analysis with OLAP tools. • Express the suitable pre-processing and visualization techniques for data analysis • Apply frequent pattern and association rule mining techniques for data analysis • Use appropriate classification and clustering techniques for data analysis. • Choose the appropriate search algorithms for problem solving.						
UNIT-I	**DATA WAREHOUSING, BUSINESS ANALYSIS AND NON-LINEAR ANALYTICAL PROCESSING**						**9**
Basic Concepts–Data Warehousing Components–Building a Data Warehouse–Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data warehouse Schemas for Decision Support, Concept Hierarchies-Characteristics of OLAP Systems–OLAP and OLTP.							
UNIT-II	**DATAMINING–INTRODUCTION**						**9**
Introduction to Data Mining Systems–Knowledge Discovery Process–Data Mining Techniques–Issues–Applications-Data Objects and Attribute types, Statistical description of data, Data Preprocessing–Cleaning-Integration-Reduction-Transformation and discretization – Data Visualization- Data similarity and dissimilarity measures.							
UNIT-III	**DATAMINING–FREQUENT PATTERN ANALYSIS**						**9**
Mining Frequent Patterns, Associations and Correlations–Mining Methods-Pattern Evaluation Method– Pattern Mining in Multilevel-Multi Dimensional Space–Constraint Based Frequent Pattern Mining-Classification using Frequent Patterns.							

UNIT-IV	CLASSIFICATION AND CLUSTERING	9
Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines–Model Evaluation and Selection-Techniques to improve Classification Accuracy-Clustering Techniques – Cluster analysis-Partitioning Methods–Hierarchical Methods–Density Based Methods–Grid Based Methods.		
UNIT-V	**INTRODUCTION TO AI**	**9**
Introduction to AI - AI Applications - Problem solving agents – search algorithms – uninformed search strategies – Heuristic search strategies – Local search and optimization problems – adversarial search – constraint satisfaction problems (CSP).		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	JiaweiHanandMichelineKamber,—DataMiningConceptsandTechniques,Third Edition, Elsevier, 2012.
2	Stuart Russell and Peter Norvig, “Artificial Intelligence – A Modern Approach”, Fourth Edition, Pearson Education, 2021.
REFERENCES:	
1	AlexBersonandStephenJ.Smith,—DataWarehousing,DataMining&OLAP,Tata McGraw–Hill Edition,35th Reprint2016.
2	K.P.Soman,ShyamDiwakar and V.Ajay,—Insight into DataMining Theory and Practice,Eastern Economy Edition,Prentice Hall of India,2006.
3	IanH.WittenandEibe Frank,—DataMining:Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.
4	https://nptel.ac.in/courses/106105174/data mining

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	-	2	2	2	2	2	-
CO2	2	2	2	-	-	-	-	-	-	1	1	1	1	1	-
CO3	2	2	2	-	-	-	-	-	-	1	2	1	2	1	-
CO4	2	1	2		-	-	-	-	-	2	1	2	1	2	-
CO5	2	2	1	-	-	-	-	-	-	-	2	1	2	1	-
Average	**2**	**1.8**	**1.8**	**-**	**-**	**-**	**-**	**-**	**-**	**1.2**	**1.6**	**1.4**	**1.6**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15018	**COMPUTER VISION**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To understand the fundamental concepts related to Image formation and processing. • To learn feature detection, matching and detection • To become familiar with feature based alignment and motion estimation • To develop skills on 3D reconstruction • To understand image based rendering and recognition						
Outcome(s)	**Upon completion of this course , students will be able to** • Explain the basic knowledge, theories and methods in image processing and computer vision. • To implement basic and some advanced image processing techniques • To apply 2D a feature-based based image alignment, segmentation and motion estimations. • To apply 3D image reconstruction techniques • To design and develop innovative image processing and computer vision applications.						
UNIT-I	**INTRODUCTION TO IMAGE FORMATION AND PROCESSING**						**9**
Computer Vision - Geometric primitives and transformations - Photometric image formation - The digital camera - Point operators - Linear filtering - More neighborhood operators - Fourier transforms - Pyramids and wavelets - Geometric transformations - Global optimization							
UNIT-II	**FEATURE DETECTION, MATCHING AND SEGMENTATION**						**9**
Points and patches - Edges - Lines - Segmentation - Active contours - Split and merge – Mean - shift and mode finding - Normalized cuts - Graph cuts and energy-based methods.							
UNIT-III	**FEATURE-BASED ALIGNMENT & MOTION ESTIMATION**						**9**
2D and 3D feature-based alignment - Pose estimation - Geometric intrinsic calibration - Triangulation - Two-frame structure from motion - Factorization - Bundle adjustment - Constrained structure and motion - Translational alignment - Parametric motion - Spline-based motion - Optical flow - Layered motion.							
UNIT-IV	**3D RECONSTRUCTION**						**9**
Shape from X - Active range finding - Surface representations - Point-based representations- Volumetric representations - Model-based reconstruction - Recovering texture maps and albedosos.							

UNIT-V	IMAGE-BASED RENDERING AND RECOGNITION	9
View interpolation Layered depth images - Light fields and Lumigraphs - Environment mattes - Video-based rendering-Object detection - Face recognition - Instance recognition - Category recognition - Context and scene understanding- Recognition databases and test sets.		
	TOTAL HOURS	**45**

TEXT BOOKS :	
1	Richard Szeliski, "Computer Vision: Algorithms and Applications", Springer- Texts in Computer Science, Second Edition, 2022.
2	Computer Vision: A Modern Approach, D. A. Forsyth, J. Ponce, Pearson Education, Second Edition, 2015.
REFERENCES:	
1	Richard Hartley and Andrew Zisserman, Multiple View Geometry in Computer Vision, Second Edition, Cambridge University Press, March 2004.
2	Christopher M. Bishop; Pattern Recognition and Machine Learning, Springer, 2006
3	E. R. Davies, Computer and Machine Vision, Fourth Edition, Academic Press, 2012.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	-	2	2	2	3	2	-
CO2	2	1	2	-	-	-	-	-	-	1	1	2	2	2	-
CO3	2	2	-	-	-	-	-	-	-	1	2	1	3	2	-
CO4	2	1	-		-	-	-	-	-	2	1	1	2	2	-
CO5	2	1	2	-	-	-	-	-	-	-	2	1	3	2	-
Average	**2**	**1.4**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**1.2**	**1.2**	**1.4**	**2.6**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15019	**NATURAL LANGUAGE PROCESSING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • Learn the fundamentals of natural language processing. • Gain knowledge in current methods for statistical approaches to machine translation. • Understand the use of CFG and PCFG in NLP. • Know the role of semantics of sentences and discourse. • Be familiar with lexical resources used in NLP techniques.						
Outcome(s)	**Upon completion of the course, the students should be able to:** • Elaborate tag in a given text with basic Language features. • Design an innovative application using NLP components. • Implement a rule based system to tackle morphology/syntax of a language. • Create a tag set to be used for statistical processing for real-time applications. • Compare and contrast the use of different statistical approaches for different types of NLP applications.						
UNIT-I	**INTRODUCTION**						9
Introduction- Phases of NLP-Challenges of NLP, Language Modeling: Grammar-based LM, Statistical LM -Regular Expressions, Finite-State Automata – English Morphology, Finite state Transducer, Tokenization, Detecting and Correcting Spelling Errors, Minimum Edit Distance.							
UNIT-II	**WORD LEVEL ANALYSIS**						9
Unsmoothed N-grams, Evaluating N-grams, Smoothing, Laplace Smoothing, Interpolation and Backoff – Word Classes, Part-of-Speech Tagging, Rule-based, Stochastic and Transformation-based tagging, Issues in PoS tagging – Hidden Markov and Maximum Entropy models.							
UNIT-III	**SYNTACTIC ANALYSIS**						9
Context-Free Grammars, Grammar rules for English, Dependency Parsing: Dependency Grammar, Graph-based dependency parsing – Syntactic Parsing, Ambiguity, Normal Forms for grammar, CYK algorithm – Dynamic Programming parsing – Probabilistic CFG, Probabilistic CYK, Probabilistic Lexicalized CFGs - Feature structures, Unification of feature structures.							
UNIT-IV	**SEMANTICS ANALYSIS AND DISCOURSE PROCESSING**						9
Semantic representation, First-Order Logic– Syntax-Driven Semantic analysis, Semantic attachments – Lexical Semantics, Sense ambiguity, Word Sense Disambiguation, Discourse Processing: cohesion-							

Reference Resolution, Discourse Coherence and Structure.		
UNIT-V	**LEXICAL RESOURCES**	9
Understanding Lexical resources, Resources: Tokenization, Stop Words, Chunking, Stemmer, Lemmatizer, Penn Treebank, Brill's Tagger, Word Net, FrameNet, Prop Bank, Brown Corpus, Word vectors, Doc2vec, Word2vec.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Daniel Jurafsky, James H. Martin—Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech, Pearson Publication, 2014.
2	Steven Bird, Ewan Klein and Edward Loper, —Natural Language Processing with Python‖, First Edition, O_Reilly Media, 2009.
REFERENCES:	
1	Breck Baldwin, —Language Processing with Java and Ling Pipe Cookbook, Atlantic Publisher, 2015.
2	Richard M Reese, —Natural Language Processing with Java‖, O_Reilly Media, 2015.
3	NitinIndurkhya and Fred J. Damerau, —Handbook of Natural Language Processing, Second Edition, Chapman and Hall/CRC Press, 2010.
4	TanveerSiddiqui, U.S. Tiwary, —Natural Language Processing and Information Retrieval‖, Oxford University Press, 2008.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	1	-	-	-	-	-	-	-	2	2	3	2	-
CO2	2	2	2	-	-	-	-	-	-	-	2	2	2	1	-
CO3	2	1	1	-	-	-	-	-	-	-	2	2	3	2	-
CO4	2	2	1	-	-	-	-	-	-	-	2	2	2	1	-
CO5	2	2	2	-	-	-	-	-	-	-	2	2	3	1	-
Average	**2**	**1.8**	**1.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2.6**	**1.4**	

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Information Technology**	**Programme Code**	**2071**

Program Elective

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT15020	**BIO-INFORMATICS**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • To study about the need for Bioinformatics technologies. • To be familiar with the modeling techniques. • To learn the models for bio logical data and different networks. • To acquire knowledge about database search methods and neural networks. • To understand the concept of pattern Matching and Visualization.
Outcome(s)	**Upon completion of the course, the students should be able to:** • Explain the concepts of bio informatics technologies. • Analyze the data warehousing and mining techniques in bio informatics. • Develop models for biological data. • Use database search methods in bio informatics • Apply pattern matching techniques to bioinformatics data – protein data genomic data.

UNIT-I	**INTRODUCTION**	**9**

Need for Bioinformatics technologies – Overview of Bioinformatics technologies Structural bioinformatics – Data format and processing – Secondary resources and applications – Role of Structural bioinformatics - Biological Data Integration System.

UNIT-II	**DATAWAREHOUSING AND DATAMINING IN BIOINFORMATICS**	**9**

Bioinformatics data – Data warehousing architecture – data quality – Biomedical data analysis – DNA data analysis – Protein data analysis – Machine learning – Neural network architecture and applications in bioinformatics.

UNIT-III	**MODELING FOR BIOINFORMATICS**	**9**

Hidden markov modeling for biological data analysis – Sequence identification –Sequence classification – multiple alignment generation – Comparative modeling –Protein modeling – genomic modeling – Probabilistic modeling – Bayesian networks – Boolean networks - Molecular modeling – Computer programs for molecular modeling.

UNIT-IV	**DATABASE SEARCH METHODS AND NEURAL NETWORKS**	**9**

Database searching for similar sequences, FASTA and BLAST sequence database similarity search, other methods of comparing database of sequences and patterns - Neural Networks, Learning algorithms: back-propagation , Applications, Sequence encoding & output interpretation, Sequence correlations & neural networks

UNIT-V	PATTERN MATCHING AND VISUALIZATION	9
Gene regulation – motif recognition – motif detection – strategies for motif detection – Visualization Fractal analysis – DNA walk models – one dimension – two dimension – higher dimension – Game representation of Biological sequences – DNA, Protein, Amino acid sequences.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Yi-Ping Phoebe Chen (Ed), "Bio Informatics Technologies", First Indian Reprint, Springer Verlag, 2007.
2	Bioinformatics: Sequence and Genome Analysis David W.Mount, David Mount
REFERENCES:	
1	Bryan Bergeron, "Bio Informatics Computing", Second Edition, Pearson Education, 2003.
2	Arthur M Lesk, "Introduction to Bioinformatics", Second Edition, Oxford University Press, 2005
3	Hooman H Rashidi, Lukas K Buehler. Bioinformatics Basics -2000.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	1	-	-	-	-	-	-	-	2	2	3	2	-
CO2	2	2	2	-	-	-	-	-	-	-	2	2	2	1	-
CO3	2	1	1	-	-	-	-	-	-	-	2	1	3	2	-
CO4	2	1	1	-	-	-	-	-	-	-	1	2	3	1	-
CO5	2	2	1	-	-	-	-	-	-	-	2	1	2	1	-
Average	**2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.8**	**1.6**	**2.6**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
22IT15021	**HUMAN COMPUTER INTERACTION**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • Learn the foundations of Human Computer Interaction. • Familiar with the design technologies for individuals and persons with disabilities. • Understand the fundamental concept of HCI Models. • Be aware of mobile HCI. • Learn about the guidelines for user interface.						
Outcome(s)	**The students will be able to** • Design effective dialog for HCI • Design effective HCI for individuals and persons with disabilities. • Assess the importance of User feedback. • Explain the HCI implications for designing multimedia/ecommerce/e-learning Websites. • Develop meaningful user interface						
UNIT-I	**FOUNDATIONSOFHCI**						**9**
The Human: I/O channels – Memory – Reasoning and problem solving; The Computer: Devices – Memory – processing and networks; Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity- Paradigms. - Case Studies.							
UNIT-II	**DESIGN&SOFTWAREPROCESS**						**9**
Interactive Design: Basics – process – scenarios – navigation – screen design – Iteration and prototyping. HCI in software process: Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design							
UNIT-III	**MODELSANDTHEORIES**						**9**
HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements – Communication and collaboration models-Hypertext, Multimedia and WWW							
UNIT-IV	**INTERACTION STYLES**						**9**
Mobile Ecosystem: Platforms, Application frameworks- Types of Mobile Applications: Widgets, Applications, Games- Mobile Information Architecture, Mobile 2.0, Mobile Design: Elements of Mobile Design, Tools. - Case Studies							
UNIT-V	**WEBINTERFACE DESIGN**						**9**

Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies	
TOTAL HOURS	**45**

TEXT BOOKS:	
1	Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, —Human Computer Interaction, 3rd Edition, Pearson Education, 2004 (UNIT I, II & III)
REFERENCES:	
1	Brian Fling, -Mobile Design and Development, First Edition, O'Reilly Media Inc., 2009
2	Bill Scott and Theresa Neil,-Designing Web Interfaces, First Edition, O'Reilly, 2009. (UNIT-V)

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	1	-	-	-	-	-	-	-	-	2	1	1	-
CO2	2	2	2	-	-	-	-	-	2	-	-	2	3	2	-
CO3	3	-	-	-	-	-	-	-	2	-	-	2	3	2	-
CO4	2	-	1	-	-	-	-	-	-	-	-	2	3	2	-
CO5	2	2	1		-	-	-	-	1	-	-	2	1	1	-
Average	**2.2**	**1.2**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**3**	**3**	**3**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr. S. Raju

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	**Information Technology**	**Programme Code**	**2071**

Program Elective

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT15022	**ROBOTICS AND AUTOMATION**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • To study the various parts of robots and fields of robotics • To learn the various power sources and sensors of robots • To study the end effectors and trajectory planning of robots • To understand the kinematics and inverse kinematics of robots • To know the control of robots for some specific applications
Outcome(s)	**Upon completion of this course, students will be able to** • Summarize the basic concepts of robotic functions • Analyze the function of sensors and power sources in the robot • Analyze the various mechanism involved in the robots • Develop programs to use a robot for various applications • Design industrial automation systems

UNIT-I	**BASIC CONCEPTS**	**9**
Definition and origin of robotics – different types of robotics – various generations of robots – degrees of freedom – Asimov's laws of robotics – dynamic stabilization of robots		

UNIT-II	**POWER SOURCES AND SENSORS**	**9**
Hydraulic, pneumatic and electric drives – determination of HP of motor and gearing ratio – variable speed arrangements – path determination – micro machines in robotics – machine vision – ranging – laser – acoustic – magnetic, fiber optic and tactile sensors.		

UNIT-III	**MANIPULATORS, ACTUATORS AND GRIPPERS**	**9**
Construction of manipulators – manipulator dynamics and force control – electronic and pneumatic manipulator control circuits – end effectors – various types of grippers – design considerations		

UNIT-IV	**KINEMATICS AND PATH PLANNING**	**9**
Solution of inverse kinematics problem – multiple solution Jacobian work envelop – hill Climbing Techniques – robot programming languages		

UNIT-V	**CASE STUDIES**	**9**
Multiple robots – machine interface – robots in manufacturing and non- manufacturing applications – robot cell design – selection of robot.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Mikell P. Weiss G.M., Nagel R.N., Odraj N.G., "Industrial Robotics", McGraw-Hill Singapore, 2012
2	Ghosh, Control in Robotics and Automation: Sensor Based Integration, Allied Publishers, Chennai, 2008
REFERENCES:	
1	Deb. S.R.,"Robotics Technology and flexible Automation", John Wiley, USA 1992
2	Klafter R.D., Chimielewski T.A., Negin M., "Robotic Engineering – An integrated approach", Prentice Hall of India, New Delhi, 1994
3	McKerrow P.J. "Introduction to Robotics", Addison Wesley, USA, 1991

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	1	2	1	-
CO3	2	2	-	-	-	-	-	-	1	1	1	1	1	2	-
CO4	2	1	-		-	-	-	-	2	2	1	1	2	1	-
CO5	2	1	2	-	-	-	-	-	2	-	2	1	1	2	-
Average	**2**	**1.4**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.4**	**1.2**	**1.6**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT15023	**TEXT AND SPEECH ANALYSIS**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • Understand natural language processing basics • Apply classification algorithms to text documents • Build question-answering and dialogue systems • Develop a speech recognition system • Develop a speech synthesizer					
Outcome(s)	**Upon completion of this course, students will be able to** • Explain existing and emerging deep learning architectures for text and speech processing • Apply deep learning techniques for NLP tasks, language modelling and machine translation • Explain coreference and coherence for text processing • Build question-answering systems, chatbots and dialogue systems • Apply deep learning models for building speech recognition and text-to-speech systems					
UNIT-I	**NATURAL LANGUAGE BASICS**					**9**
Foundations of natural language processing – Language Syntax and Structure- Text Preprocessing and Wrangling – Text tokenization – Stemming – Lemmatization – Removing stop- words – Feature Engineering for Text representation – Bag of Words model- Bag of N-Grams model – TF-IDF model						
UNIT-II	**TEXT CLASSIFICATION**					**9**
Vector Semantics and Embeddings -Word Embeddings - Word2Vec model – Glove model – Fast Text model – Overview of Deep Learning models – RNN – Transformers – Overview of Text summarization and Topic Models						
UNIT-III	**QUESTION ANSWERING AND DIALOGUE SYSTEMS**					**9**
Information retrieval – IR-based question answering – knowledge-based question answering – language models for QA – classic QA models – chatbots – Design of dialogue systems -– evaluating dialogue systems						
UNIT-IV	**TEXT-TO-SPEECH SYNTHESIS**					**9**

Overview. Text normalization. Letter-to-sound. Prosody, Evaluation. Signal processing - Concatenative and parametric approaches, WaveNet and other deep learning-based TTS systems		
UNIT-V	**AUTOMATIC SPEECH RECOGNITION**	**9**
Speech recognition: Acoustic modelling – Feature Extraction - HMM, HMM-DNN systems		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Daniel Jurafsky and James H. Martin, "Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition", Third Edition, 2022.
REFERENCES:	
1	Dipanjan Sarkar, "Text Analytics with Python: A Practical Real-World approach to Gaining Actionable insights from your data", APress,2018.
2	TanveerSiddiqui, Tiwary U S, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	-	2	2	2	2	1	2	-
CO2	3	-	-	-	-	-	-	-	1	1	2	2	2	2	-
CO3	3	-	-	-	-	-	-	-	1	1	2	2	-	1	-
CO4	3		-		-	-	-	-	2	2	1	2	1	2	-
CO5	3	-	-	-	-	-	-	-	1	-	2	2	1	2	-
Average	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.4**	**1.2**	**1.8**	**2**	**1**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15024	**SOFT COMPUTING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • Acquire knowledge of Artificial Neural Networks. • Learn the fundamentals of non-traditional technologies and approaches to solving hard real-world problems. • Gain expertise in artificial neural network with fuzzy logic, and genetic algorithms to solve problem. • Provide the basic Knowledge Hybrid System. • Familiar with the fundamental of genetic algorithms.						
Outcome(s)	**Upon completion of this course, students will be able to:** • Explain the importance of tolerance of imprecision and uncertainty for design of robust and low-cost intelligent machines. • Analyze soft computing theories fundamentals and so they will be able to design program system. • Illustrate the concept of neural networks, fuzzy logic, genetic algorithms, probabilistic reasoning, rough sets, chaos, hybrid approaches. • Apply suitableof computing techniques for applications. • Analyze the soft computing techniques for complex problems.						
UNIT-I	**INTRODUCTION**						**9**
Introduction- Artificial Intelligence - Artificial Neural Networks - biological neurons - Basic models of artificial neural networks – Fuzzy Systems - GeneticAlgorithmandEvolutionaryProgramming-SwarmIntelligentSystems – Learning Rules: Hebbian and Delta-Perceptron Network-Adaline Network- Madaline Network.							
UNIT-II	**ARTIFICIALNEURAL NETWORKS**						**9**
Fundamental of neural networks - Characteristic of Neural networks – Back propagation Neural Networks –Kohonen Neural Network -Learning Vector Quantization - Hamming Neural Network – Hopfield Neural Network- Bi-directional Associative Memory – Adaptive Resonance Theory Neural Networks.							
UNIT-III	**FUZZYSYSTEMS**						**9**
IntroductiontoFuzzyLogic,ClassicalSetsandFuzzySets–ClassicalRelationsandFuzzyRelations -Fuzzy sets-Defuzzification–Applications							
UNIT-IV	**GENETICALGORITHMS**						**9**

Fundamental of genetic algorithms - Basic Concepts- Working Principles -Encoding- Fitness Function – Reproduction -Inheritance - Operators – Cross Over – Inversion and Deletion -Mutation Operator – Bit-wise Operators - Generation cycle - Convergence of Genetic		
UNIT-V	**HYBRIDSYSTEMS**	**9**
Hybrid Systems – Neural Networks, Fuzzy Logic and Genetic-GA Based Weight Determination – Application-LR Type Fuzzy Numbers – Fuzzy Neuron – Fuzzy BP Architecture – Learning in Fuzzy BP- Inference by Fuzzy BP – Fuzzy Associative memories.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	N.P.Padhy, S.P.Simon," Soft Computing with MAT LAB Programming", OxfordUniversity Press,2015
2	S.Rajasekaran, G.A.VijayalakshmiPai, "Neural Networks, Fuzzy Logic and Genetic Algorithm,SynthesisandApplications",PHILearningPvt.Ltd., 2017.
REFERENCES:	
1	James A. Freeman and David M. Skapura, —Neural Networks Algorithms, Applications, and Programming Techniques, Addison Wesley, 2003.
2	Jyh-ShingRogerJang,Chuen-TsaiSun,EijiMizutani,—Neuro-FuzzyandSoftComputing, Prentice-HallofIndia,2002
3	KwangH.Lee,—FirstcourseonFuzzyTheoryandApplications,Springer,2005.
4	George J. Klirand Bo Yuan, —Fuzzy Sets and Fuzzy Logic-Theory and Applications, PrenticeHall, 1996.
5	JamesA.FreemanandDavidM.Skapura,—NeuralNetworksAlgorithms,Applications,and ProgrammingTechniques,AddisonWesley,2003.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	-	2	2	2	3	2	-
CO2	2	1	2	-	-	-	-	-	-	1	1	1	2	2	-
CO3	2	2	1	-	-	-	-	-	-	1	2	1	3	2	-
CO4	2	1	-		-	-	-	-	-	2	1	1	2	1	-
CO5	3	-	-	-	-	-	-	-	-	-	2	1	3	2	-
Average	**2.2**	**1.2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1.2**	**1.2**	**1.2**	**2.6**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
22IT15025	**GAME THEORY**	**L**	**T**	**P**	**C**	**100**
		3	0	0	3	
Objective(s)	**The student should be made to:** • To introduce the student to the notion of a game, its solutions concepts, and other basic notions and tools of game theory, and the main applications for which they are appropriate, including electronic trading markets. • To formalize the notion of strategic thinking and rational choice by using the tools of game theory, and to provide insights into using game theory in modeIIing applications. • To draw the connections between game theory, computer science, and economics, especially emphasizing the computational issues. • To introduce contemporary topics in the intersection of game theory, computer science, and economics. • To apply game theory in searching, auctioning and trading.					
Outcome(s)	**Upon completion of this course, students will be able to** • Discuss the notion of a strategic game and equilibria and identify the characteristics of main applications of these concepts. • Discuss the use of Nash Equilibrium for other problems. • Identify key strategic aspects and based on these be able to connect them to appropriate game theoretic concepts given a real world situation. • Identify some applications that need aspects of Bayesian Games. • Implement a typical Virtual Business scenario using Game theory.					
UNIT-I	**INTRODUCTION**					**9**
Introduction — Making rational choices: basics of Games — strategy — preferences — payoffs — Mathematical basics — Game theory — Rational Choice — Basic solution concepts-non-cooperative versus cooperative games — Basic computational issues — finding equilibria and learning in games- Typical application areas for game theory (e.g. Google's sponsored search, eBay auctions, electricity trading markets).						
UNIT-II	**GAMES WITH PERFECT INFORMATION**					**9**
Games with Perfect Information — Strategic games — prisoner's dilemma, matching pennies - Nash equilibria —mixed strategy equilibrium — zero-sum games						

UNIT-III	GAMES WITH IMPERFECT INFORMATION	9
Games with Imperfect Information — Bayesian Games — Motivational Examples — General Definitions— Information aspects — Illustrations — Extensive Games with Imperfect — Information — Strategies — Nash Equilibrium —Repeated Games — The Prisoner's Dilemma — Bargaining		
UNIT-IV	**NON-COOPERATIVE GAME THEORY**	**9**
Non-cooperative Game Theory — Self-interested agents — Games in normal form — Analyzing games: from optimality to equilibrium — Computing Solution Concepts of Normal — Form Games — Computing Nash equilibria of two-player, zero-sum games —Computing Nash equilibria of two-player, general- sum games — Identifying dominated strategies		
UNIT-V	**MECHANISM DESIGN**	**9**
Aggregating Preferences — Social Choice — Formal Model — Voting — Existence of social functions — Ranking systems — Protocols for Strategic Agents: Mechanism Design — Mechanism design with unrestricted preferences		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	M. Machler, E. Solan, S. Zamir, Game Theory, Cambridge University Press, 2013.
REFERENCES:	
1	M. J. Osborne, An Introduction to Game Theory. Oxford University Press, 2012.
2	N. Nisan, T. Roughgarden, E. Tardos, and V. V. Vazirani, Algorithmic Game Theory. Cambridge University Press, 2007.
3	A.Dixit and S. Skeath, Games of Strategy, Second Edition. W W Norton & Co Inc, 2004.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	1	1	3	2	-
CO4	2	1	-		-	-	-	-	2	2	1	-	2	2	-
CO5	2	2	2	-	-	-	-	-	2	-	2	-	3	2	-
Average	**2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.4**	**1.8**	**2.6**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15026	**KNOWLEDGE ENGINEERING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made :** • To understand the basics of Knowledge Engineering. • To discuss methodologies and modeling for Agent Design and Development. • To design and develop ontologies. • To apply reasoning with ontologies and rules. • To understand learning and rule learning.						
Outcome(s)	**Upon completion of this course, students will be able to** • Understand the basics of Knowledge Engineering. • Apply methodologies and modelling for Agent Design and Development. • Design and develop ontologies. • Apply reasoning with ontologies and rules. • Understand learning and rule learning.						
UNIT-I	**REASONING UNDER UNCERTAINTY**						**9**
Introduction – Abductive reasoning – Probabilistic reasoning: Enumerative Probabilities – Subjective Bayesian view – Belief Functions – Baconian Probability – Fuzzy Probability – Uncertainty methods - Evidence-based reasoning – Intelligent Agent – Mixed-Initiative Reasoning – Knowledge Engineering.							
UNIT-II	**METHODOLOGY AND MODELING**						**9**
Conventional Design and Development – Development tools and Reusable Ontologies – Agent Design and Development using Learning Technology – Problem Solving through Analysis and Synthesis – Inquiry-driven Analysis and Synthesis – Evidence-based Assessment – Believability Assessment – Drill-Down Analysis, Assumption-based Reasoning, and What-If Scenarios.							
UNIT-III	**ONTOLOGIES – DESIGN AND DEVELOPMENT**						**9**
Concepts and Instances – Generalization Hierarchies – Object Features – Defining Features – Representation – Transitivity – Inheritance – Concepts as Feature Values – Ontology Matching. Design and Development Methodologies – Steps in Ontology Development – Domain Understanding and Concept Elicitation – Modelling-based Ontology Specification.							
UNIT-IV	**REASONIING WITH ONTOLOGIES AND RULES**						**9**
Production System Architecture – Complex Ontology-based Concepts – Reduction and Synthesis rules and the Inference Engine – Evidence-based hypothesis analysis – Rule and Ontology Matching – Partially Learned Knowledge – Reasoning with Partially Learned Knowledge.							

UNIT-V	LEARNING AND RULE LEARNING	9
Machine Learning – Concepts – Generalization and Specialization Rules – Types – Formal definition of Generalization. Modelling, Learning and Problem Solving – Rule learning and Refinement – Overview – Rule Generation and Analysis – Hypothesis Learning.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Gheorghe Tecuci, DorinMarcu, MihaiBoicu, David A. Schum, Knowledge Engineering Building Cognitive Assistants for Evidence-based Reasoning, Cambridge University Press, First Edition, 2016. (Unit 1 – Chapter 1 / Unit 2 – Chapter 3,4 / Unit 3 – Chapter 5, 6 / Unit 4 - 7 , Unit 5–Chapter 8, 9)
REFERENCES:	
1	Ronald J. Brachman, Hector J. Levesque: Knowledge Representation and Reasoning, Morgan Kaufmann, 2004
2	Ela Kumar, Knowledge Engineering, I K International Publisher House, 2018
3	John F. Sowa: Knowledge Representation: Logical, Philosophical, and Computational Foundations, Brooks/Cole, Thomson Learning, 2000.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	3	-	-	-	-	-	-	-	-	2	1	1	-
CO2	2	2	2	-	-	-	-	-	2	-	-	1	3	2	-
CO3	3	-	-	-	-	-	-	-	2	-	-	1	2	2	-
CO4	2	-	-	-	-	-	-	-	1	-	-	1	1	2	-
CO5	2	2	3	-	-	-	-	-	-	-	-	2	1	1	-
Average	**2.2**	**1.2**	**1.6**	**-**	**-**	**-**	**-**	**-**	**1**	**1.2**	**1.2**	**1.4**	**1.6**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRAENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT15027	**CYBER PHYSICAL SYSTEMS**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • Study the basic concepts, requirements, principles, and techniques in emerging cyber physical systems. • Know about prototyping in cyber-physical system. □ Know about the real-world problems through Cyber Physical Systems □ Learn about challenges in implementing a cyber-physical system from a computational perspective. • Understand the fundamentals of cyber physical systems.					
Outcome(s)	**By completing this course the student will be able to:** • Develop the ability to interact with Cyber Physical System • To address real-world problems through Cyber Physical Systems.• Explain the abstraction and various system architectures • Explain the semantics of a CPS model • Analyse the common methods used to secure cyber-physical systems					
UNIT-I	**COMPUTATIONAL FOUNDATION OF CPS**					**9**
Cyber Physical Systems in Real world,-Basic Principle of Cyber Physical Systems-Cyber Physical Systems Design Recommendations- CPS system requirements -Cyber Physical System Application-Case study of Cyber Physical Systems						
UNIT-II	**CPS - PLATFORM COMPONENTS**					**9**
Hardware platforms for Cyber Physical Systems (Sensors/Actuators, Microprocessor/Microcontrollers), Wireless Technologies for Cyber Physical Systems						
UNIT-III	**MODELS AND DYNAMICS BEHAVIOURS**					**9**
Continuous Dynamics, Discrete dynamics, Hybrid Systems Structure of Models, Synchronous Reactive models, Dataflow models of computation, Timed models of computation-Structure of Models, Synchronous Reactive models, Dataflow models of computation, Timed models of computation						

UNIT-IV	**STUDY OF EMBEDDED SYSTEMS VS INTERNET OF THINGS VS CYBER PHYSICAL SYSTEM**	**9**
Design of Embedded Systems (I/O Units, Multitasking and Scheduling), Internet of Things Architecture, CPS Architecture.		
UNIT-V	**SECURITY AND PRIVACY IN CYBER PHYSICAL SYSTEMS**	**9**
Security and Privacy Issues in CPSs, Local Network Security for CPSs, Internet-Wide Secure Communication, Security and Privacy for Cloud-Interconnected CPSs, Case Study: Cyber security in Digital Manufacturing/Industry 4.0		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Principles of Cyber Physical Systems, Rajeev Alur, MIT Press, 2015
2	E. A. Lee, SanjitSeshia , "Introduction to Embedded Systems – A Cyber–Physical Systems Approach", Second Edition, MIT Press, 2017, ISBN: 978-0-262-53381-2
REFERENCES:	
1	Guido Dartmann, Houbing song, Ankeschmeink, “Big data analytics for Cyber Physical System”, Elsevier, 2019
2	Houbing song, Danda B Rawat, Sabina Jeschke, Christian Brecher, “Cyber Physical Systems Foundations, Principles and Applications”, Elsevier, 2017
3	Chong Li, MeikangQiu, “Reinforcement Learning for Cyber Physical Systems with Cyber Securities Case Studies”, CRC press, 2019

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	-	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	1	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	3	2	-
CO4	2	1	-		-	-	-	-	2	2	1	1	2	2	-
CO5	2	1	2	-	-	-	-	-	2	-	2	1	3	2	-
Average	**2**	**1.4**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.2**	**1.2**	**2**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE(Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
Program Elective							
Course code	**Course Name**	**Hours/week**				**Credit**	**Maximum marks**
		L	**T**	**P**		**C**	
22IT15028	**CYBER FORENSICS**	3	0	0		3	**100**
Objective(s)	**The student should be made to:** • **Learn about the computer forensics.** • BeFamiliar with forensics tools. • **Know about the analysis and validation of forensics data.** • Understand the ethical hacking and Sniffing. • Be familiar with ethical hacking in web.						
Outcome(s)	**Upon completion of this course, students will be able to** • Summarize the basic concepts of Computer forensics & its principles. • Explain the basics of forensics tools. • Analyze and validate forensic data. • Explain the ethical hacking and sniffing concepts. • Apply the ethical hacking principles in hacking mobile platforms.						
UNIT-I	**INTRODUCTION TO COMPUTER FORENSICS**						9
Introduction to Traditional Computer Crime, Traditional problems associated with Computer Crime. Introduction to Identity Theft & Identity Fraud. Types of CF techniques - Incident and incident response methodology - Forensic duplication and investigation. Preparation for IR: Creating response tool kit and IR team. - Forensics Technology and Systems - Understanding Computer Investigation - Data Acquisition.							
UNIT-II	**EVIDENCE COLLECTION AND FORENSICS TOOLS**						9
Processing Crime and Incident Scenes - Working with Windows and DOS Systems. Current Computer Forensics Tools: Software/ Hardware Tools.							
UNIT-III	**ANALYSIS AND VALIDATION**						9
Validating Forensics Data - Data Hiding Techniques Performing Remote Acquisition Network Forensics - Email Investigations - Cell Phone and Mobile Devices Forensics							
UNIT-IV	**ETHICAL HACKING**						9
Introduction to Ethical Hacking – Foot printing and Reconnaissance - Scanning Networks Enumeration - System Hacking - Malware Threats - Sniffing							
UNIT-V	**ETHICAL HACKING IN WEB**						9
Social Engineering - Denial of Service - Session Hijacking - Hacking Web servers - Hacking Web Applications - SQL Injection - Hacking Wireless Networks - Hacking Mobile Platforms							
						TOTAL HOURS	**45**

TEXT BOOKS:	
1	Bill Nelson, Amelia Phillips, Frank Enfinger, Christopher Steuart, —ComputerForensics and Investigations, Cengage Learning, India Edition, 2016.
2	CEH official Certified Ethical Hacking Review Guide, Wiley India Edition, 2015.
REFERENCES:	
1	MarjieT.Britz, —Computer Forensics and Cyber Crime: An Introduction, 3rd Edition,Prentice Hall, 2013.
2	AnkitFadia — Ethical Hacking Second Edition, Macmillan India Ltd, 2006
3	Kenneth C.Brancik —Insider Computer Fraud‖Auerbach Publications Taylor &Francis Group–2009

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	-	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	1	2	1	-
CO3	2	2	-	-	-	-	-	-	1	1	1	1	3	1	-
CO4	2	1	-		-	-	-	-	2	2	1	1	2	2	-
CO5	2	1	2	-	-	-	-	-	2	-	2	1	1	1	-
Average	**2**	**1.4**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1**	**1.2**	**1.6**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr. S. Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT15029	**INFORMATION SECURITY**	3	0	0	3	**100**
Objective(s)	• To understand the basics of Information Security • To know the legal, ethical and professional issues in information security. • To gain information about the aspects of risk management • To know about the security architecture, policies, standards and practices. • To acquire knowledge about the Security technology and Intrusion Detection System.					
Outcome(s)	**Upon completion of this course , students will be able to** • Discuss the basics of information security • Illustrate the legal, ethical and professional issues in information security • Demonstrate the aspects of risk management. • Explain the various standards of Information Security System. • Design and implementation of Security Techniques.					
UNIT-I	**INTRODUCTION**					**9**
History - What is Information Security? - Critical Characteristics of Information - NSTISSC Security Model - Components of an Information System - Securing the Components - Balancing Security and Access - The SDLC - The Security SDLC.						
UNIT-II	**SECURITY INVESTIGATION**					**9**
Need for Security - Business Needs - Threats – Attacks - Legal - Ethical and Professional Issues. An overview of computer security-Access control matrix, Policy-Security policies-Confidentiality policies, Integrity Policies and Hybrid policies.						
UNIT-III	**SECURITY ANALYSIS**					**9**
Introduction - An Overview of Risk Management - Risk Identification -Risk Assessment - Risk Control Strategies - Selecting a Risk Control Strategy - Risk Management Discussion Points – Documenting Results - Recommended Practices in Controlling Risk.						
UNIT-IV	**LOGICAL DESIGN**					**9**
Introduction - Information Security Policy, Standards and Practices -The Information Security Blueprint: ISO 17799/BS 7799, ISO 27001and its controls - NIST Security Models - Design of Security Architecture - Continuity Strategies.						

UNIT-V	PHYSICAL DESIGN	9
Security Technology – IDS - Scanning and Analysis Tools – Cryptography-Access Control Devices - Physical Security - Security and Personnel.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Michael E Whitman and Herbert J Mattord, —Principles of Information Security, Vikas Publishing House, New Delhi, 2003 (Unit I – V)
REFERENCES:	
1	Micki Krause, Harold F. Tipton, — Handbook of Information Security Management, Vol 1-3 CRC Press LLC, 2004.
2	Stuart McClure, Joel Scrambray, George Kurtz, —Hacking Exposed, Tata McGraw-Hill, 2003
3	Matt Bishop, — Computer Security Art and Science, Pearson/PHI, 2002.
E-REFERENCES:	
1.	http://www.consciouskidsacademy.org/Principles%20of%20Information%20Security%204th%20edition%20-%20Michael%20E%20Whitman.pdf
2.	https://lecturenotes.in/subject/453/information-security-is

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	-	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	2	3	1	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	-	1	-
CO4	2	1	-		-	-	-	-	2	2	1	2	2	1	-
CO5	3	-	-	-	-	-	-	-	2	-	2	2	-	1	-
Average	**2.2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.2**	**1.8**	**1**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15030	**ETHICAL HACKING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To understand the basics of computer based vulnerabilities. • To explore different foot printing, reconnaissance and scanning methods. • To expose the enumeration and vulnerability analysis methods. • To understand hacking options available in Web and wireless applications. • To explore the options for network protection.						
Outcome(s)	**At the end of this course, the students will be able:** • To express knowledge on basics of computer based vulnerabilities • To gain understanding on different foot printing, reconnaissance and scanning methods. • To demonstrate the enumeration and vulnerability analysis methods • To gain knowledge on hacking options available in Web and wireless applications. • To acquire knowledge on the options for network protection						
UNIT-I	**INTRODUCTION**						**9**
Ethical Hacking : Overview- Role of Security and Penetration Testers .- Penetration Testing. Methodologies- Laws of the Land - Overview of TCP/IP- The Application Layer - The Transport Layer - The Internet Layer - IP Addressing .- Network and Computer Attacks - Malware - Protecting Against Malware Attacks.- Intruder Attacks - Addressing Physical Security.							
UNIT-II	**FOOTPRINTING,RECONNAISSANCEANDSCANNINGNETWORKS**						**9**
Foot printing Concepts – Foot printing through Search Engines, Web Services, Social Networking Sites, Website, Email - Competitive Intelligence – Foot printing through Social Engineering – Foot printing Tools - Network Scanning Concepts - Port-Scanning Tools - Scanning Techniques - Scanning Beyond IDS and Firewall.							
UNIT-III	**ENUMERATIONANDVULNERABILITYANALYSIS**						**9**
Enumeration Concepts - NetBIOS Enumeration – SNMP, LDAP, NTP, SMTP and DNS Enumeration - Vulnerability Assessment Concepts - Desktop and Server OS Vulnerabilities - Windows OS Vulnerabilities - Tools for Identifying Vulnerabilities in Windows- Linux OS							

Vulnerabilities- Vulnerabilities of Embedded OSS.		
UNIT-IV	**SYSTEM HACKING**	**9**
Hacking Web Servers - Web Application Components- Vulnerabilities - Tools for Web Attackers and Security Testers Hacking Wireless Networks - Components of a Wireless Network – War driving- Wireless Hacking - Tools of the Trade -		
UNIT-V	**NETWORK PROTECTION SYSTEMS**	**9**
Access Control Lists. - Cisco Adaptive Security Appliance Firewall - Configuration and Risk Analysis Tools for Firewalls and Routers - Intrusion Detection and Prevention Systems - Network- Based and Host-Based IDSs and IPSs - Web Filtering - Security Incident Response Teams – Honey pots.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Michael T. Simpson, Kent Backman, and James E. Corley, Hands-On Ethical Hacking andNetworkDefense,CourseTechnology,DelmarCengageLearning,2010.
2	The Basics of Hacking and Penetration Testing - Patrick EngebretsonSYNGRESS,Elsevier,2013.
REFERENCES:	
1	The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws, DafyddStuttardand MarcusPinto,2011.
2	Black Hat Python:Python Programming for Hackers and Pentesters,JustinSeitz, 2014.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	2	1	-	-	-	-	-	-	-	2	2	3	-	-
CO2	2	2	2	-	-	-	-	-	-	-	2	2	2	-	-
CO3	2	2	2	-	-	-	-	-	-	-	2	2	-	2	-
CO4	3	-	-	-	-	-	-	-	-	-	-	1	-	3	-
CO5	3	-	-	-	-	-	-	-	-	-	2	1	-	-	-
Average	**2.4**	**1.2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.6**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15031	**SECURITY AND PRIVACY IN CLOUD**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To Introduce Cloud Computing terminology, definition & concepts • To understand the security design and architectural considerations for Cloud • To understand the Identity, Access control in Cloud • To follow best practices for Cloud security using various design patterns • To be able to monitor and audit cloud applications for security						
Outcome(s)	**Upon completion of this course , students will be able to** • Describe the cloud concepts and fundamentals. • Explain the security challenges in the cloud. • Define cloud policy and Identity and Access Management. • Understand various risks and audit and monitoring mechanisms in the cloud. • Define the various architectural and design considerations for security in the cloud						
UNIT-I	**FUNDAMENTALS OF CLOUD SECURITY CONCEPTS**					**9**	
Overview of cloud security- Security Services - Confidentiality, Integrity, Authentication, Non-repudiation, Access Control - Basic of cryptography - Conventional and public-key cryptography, hash functions, authentication, and digital signatures.							
UNIT-II	**SECURITY DESIGN AND ARCHITECTURE FOR CLOUD**					**9**	
Security design principles for Cloud Computing - Comprehensive data protection - End-to-end access control - Common attack vectors and threats - Network and Storage - Secure Isolation Strategies - Virtualization strategies - Inter-tenant network segmentation strategies – Data Protection strategies: Data retention, deletion and archiving procedures for tenant data, Encryption, Data Redaction, Tokenization, Obfuscation, PKI and Key.							
UNIT-III	**ACCESS CONTROL AND IDENTITY MANAGEMENT**					**9**	
Access control requirements for Cloud infrastructure - User Identification - Authentication and Authorization - Roles-based Access Control - Multi-factor authentication - Single Sign-on, Identity Federation - Identity providers and service consumers - Storage and network access control options - OS Hardening and minimization - Verified and measured boot - Intruder Detection and prevention							
UNIT-IV	**CLOUD SECURITY DESIGN PATTERNS**					**9**	
Introduction to Design Patterns, Cloud bursting, Geo-tagging, Secure Cloud Interfaces, Cloud Resource Access Control, Secure On-Premise Internet Access, Secure External Cloud							

UNIT-V	MONITORING, AUDITING AND MANAGEMENT	9
Proactive activity monitoring - Incident Response, Monitoring for unauthorized access, malicious traffic, abuse of system privileges - Events and alerts - Auditing – Record generation, Reporting and Management, Tamper-proofing audit logs, Quality of Services, Secure Management, User management, Identity management, Security Information and Event Management		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Raj Kumar Buyya , James Broberg, and rzej Goscinski, —Cloud Computing:‖, Wiley 2013
2	Dave shackleford, —Virtualization Security‖, SYBEX a Wiley Brand 2013.
REFERENCES:	
1	Mark C. Chu-Carroll —Code in the CloudII,CRC Press, 2011
2	Mastering Cloud Computing Foundations and Applications Programming RajkumarBuyya, Christian Vechhiola, S. ThamaraiSelvi
3	Mather, Kumaraswamy and Latif, —Cloud Security and Privacy‖, OREILLY 2011

COs Vs POs and PSOs Mapping

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	2	-	-	-	-	-	-	-	-	2	1	3	2	-
CO2	2	2	-	-	-	-	-	-	-	-	1	2	-	1	-
CO3	2	2	-	-	-	-	-	-	-	-	1	1	3	2	-
CO4	2	2	-	-	-	-	-	-	-	-	2	1	-	1	-
CO5	2	2	-	-	-	-	-	-	-	-	1	2	3	1	-
Average	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.4**	**1.4**	**1.8**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15032	**EMBEDDED SYSTEMS AND IOT**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To learn the internal architecture and programming of an embedded processor. • To introduce interfacing I/O devices to the processor. • To introduce the evolution of the Internet of Things (IoT). • To build a small low-cost embedded and IoT system using Arduino/Raspberry Pi/ open platform. • To apply the concept of Internet of Things in real world scenario.						
Outcome(s)	**Upon completion of this course , students will be able to** • Explain the architecture of embedded processors. • Write embedded C programs. • Design simple embedded applications. • Compare the communication models in IOT • Design IoT applications using Arduino/Raspberry Pi /open platform.						
UNIT-I	**8-BIT EMBEDDED PROCESSOR**						**9**
8-Bit Microcontroller – Architecture – Instruction Set and Programming – Programming Parallel Ports – Timers and Serial Port – Interrupt Handling.							
UNIT-II	**EMBEDDED C PROGRAMMING**						**9**
Memory And I/O Devices Interfacing – Programming Embedded Systems in C – Need For RTOS – Multiple Tasks and Processes – Context Switching – Priority Based Scheduling Policies.							
UNIT-III	**IOT AND ARDUINO PROGRAMMING**						**9**
Introduction to the Concept of IoT Devices – IoT Devices Versus Computers – IoT Configurations – Basic Components – Introduction to Arduino – Types of Arduino– Arduino Tool chain – Arduino Programming Structure – Sketches – Pins – Input/output From Pins Using Sketches – Introduction to Arduino Shields – Integration of Sensors and Actuators with Arduino.							
UNIT-IV	**IOT COMMUNICATION AND OPEN PLATFORMS**						**9**
IoT Communication Models and APIs – IoT Communication Protocols – Bluetooth – WiFi – ZigBee – GPS – GSM modules – Open Platform (like Raspberry Pi) – Architecture – Programming – Interfacing – Accessing GPIO Pins – Sending and Receiving Signals Using GPIO Pins – Connecting to the Cloud.							

UNIT-V	APPLICATIONS DEVELOPMENT	9
Complete Design of Embedded Systems – Development of IoT Applications – Home Automation – Smart Agriculture – Smart Cities – Smart Healthcare.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Muhammed Ali Mazidi, Janice GillispieMazidi, Rolin D. McKinlay, "The 8051 Microcontroller and Embedded Systems", Pearson Education, Second Edition, 2014
2	Robert Barton, Patrick Grossetete, David Hanes, Jerome Henry, Gonzalo Salgueiro, "IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", CISCO Press, 2017.
REFERENCES:	
1	Michael J. Pont, "Embedded C", Pearson Education, 2007.
2	Wayne Wolf, "Computers as Components: Principles of Embedded Computer System Design", Elsevier, 2006.
3	Andrew N Sloss, D. Symes, C. Wright, "Arm System Developer's Guide", Morgan Kauffman/ Elsevier, 2006

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	1	-	-	-	-	-	-	-	1	3	3	2	-
CO2	2	2	2	-	-	-	-	-	-	-	1	3	2	1	-
CO3	2	2	1	-	-	-	-	-	-	-	2	2	2	2	-
CO4	2	1	1	-	-	-	-	-	-	-	1	3	1	1	-
CO5	2	2	2	-	-	-	-	-	-	-	1	3	2	1	-
Average	**2**	**1.8**	**1.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.2**	**2.8**	**2**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT15033	**SOCIAL NETWORK ANALYSIS**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • To understand the concept of semantic web and related applications. • To learn knowledge representation using ontology. • To understand human behavior in social web and related communities. • To provide knowledge of predicting human behavior for social communities • To learn visualization of social networks.					
Outcome(s)	**Upon completion of the course, the students should be able to:** • Explain semantic web related applications. □ Describe the knowledge representation using ontology. □ Predict human behavior in social web and related communities. □ Enhance the knowledge of predicting human behavior for social communities. □ Explain the applications of Visualize social networks.					
UNIT-I	**INTRODUCTION**					**9**
Introduction to Semantic Web: Limitations of current Web - Development of Semantic Web - Emergence of the Social Web Social Network Analysis: Social Networks Perspective - Analysis of Network Data - Interpertation of Network Data - Social Network Analysis in the Social and Behavioral Sciences - Metrics in social network analysis						
UNIT-II	**SOCIAL NETWORK ANALYSIS SOFTWARE, TOOLS AND LIBRARIES**					**9**
Modelling and aggregating social network data: Ontological representation of social individuals – Ontological representation of social relationships - Aggregating and reasoning with social network data – Advanced representations. Social network analysis software - Tools – Libraries.						
UNIT-III	**CLIQUES, CLUSTERS AND COMPONENTS**					**9**
Components and Sub graphs: Sub graphs - Ego Networks, Triads, Cliques, Hierarchical Clustering, Triads, Network Density and conflict. Density: Egocentric and Socio centric - Digression on Absolute Density – Community structure and Density, Centrality : Local and Global - Centralization and Graph Centers, Cliques and their intersections, Components and Citation Circles - Positions, Sets and Clusters.						

UNIT-IV	**PREDICTING HUMAN BEHAVIOUR AND PRIVACY ISSUES**	**9**
Understanding and predicting human behavior for social communities - User data management - Inference and Distribution - Enabling new human experiences - Reality mining - Context -Awareness - Privacy in online social networks - Trust in online environment - Trust models based on subjective logic - Trust network analysis		
UNIT-V	**GRAPH DATA IN THE REAL WORLD AND APPLICATION OF SOCIAL NETWORKS**	**9**
Medium data - Tradition, Big Data, Small Data - Flat File Representations, Medium Data – Data Representation, Working with 2-Mode Data, Social Networks and Big Data, Big Data at work. Visualizing online social networks, Advances in Network .		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	PeterMika,-SocialNetworksandtheSemanticWeb,FirstEdition,Springer2007.
2	BorkoFurht,-HandbookofSocialNetwork Technologies andApplications,1st Edition,Springer, 2010.
REFERENCES:	
1	GuandongXu,YanchunZhangandLinLi,-WebMiningandSocialNetworking–Techniquesand applications, First Edition, Springer,2011.
2	DionGohandSchubertFoo,-SocialinformationRetrievalSystems:EmergingTechnologiesand Applicationsfor Searching theWebEffectively,IGIGlobal Snippet,2008.
3	MaxChevalier,ChristineJulienandChantalSoulé-Dupuy,-CollaborativeandSocialInformation Retrievaland Access:TechniquesforImproved userModelling,IGIGlobal Snippet,2009.
4	John G. Breslin, Alexander Passantand Stefan Decker, -The Social SemanticWeb, Springer, 2009.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	2	1	3	2	-
CO2	2	-	-	-	-	-	-	2	-	1	1	2	3	1	-
CO3	2	2	-	-	-	-	-	2	-	1	1	2	2	2	-
CO4	2	2	-	-	-	-	-	2	-	2	2	1	2	3	-
CO5	2	1	-	-	-	-	-	-	-	2	1	2	2	2	-
Average	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**1.2**	**-**	**1.6**	**1.4**	**1.6**	**2.6**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
22IT15034	**5G NETWORKS**	**L**	**T**	**P**	**C**	**100**
		3	0	0	3	
Objective(s)	**The student should be made to:** • To learn the evolution of wireless networks. • To get acquainted with the fundamentals of 5G networks. • To study the processes associated with 5G architecture. • To study spectrum sharing and spectrum trading. • To learn the security features in 5G networks.					
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the evolution of wireless networks. • Summarize the concepts of 5G networks. • Comprehend the 5G architecture and protocols. • Explain the dynamic spectrum management. • Describe the security aspects in 5G networks.					
UNIT-I	**EVOLUTION OF WIRELESS NETWORKS**					**9**
Networks evolution: 2G, 3G, 4G, evolution of radio access networks, need for 5G. 4G versus 5G, Next Generation core (NG-core), visualized Evolved Packet core (VEPC).						
UNIT-II	**5G CONCEPTS AND CHALLENGES**					**9**
Fundamentals of 5G technologies, overview of 5G core network architecture,5G new radio and cloud technologies, Radio Access Technologies (RATs), EPC for 5G.						
UNIT-III	**NETWORK ARCHITECTURE AND THE PROCESSES**					**9**
5G architecture and core, network slicing, multi access edge computing(MEC)visualization of 5G components, end-to-end system architecture, service continuity, relation to EPC, and edge computing. 5G protocols: 5G NAS,NGAP, GTP-U, IPSec and GRE.						
UNIT-IV	**DYNAMIC SPECTRUM MANAGEMENT AND MM-WAVES**					**9**
Mobility management, Command and control, spectrum sharing and spectrum trading, cognitive radio based on 5G, millimeter waves.						
UNIT-V	**SECURITY IN 5G NETWORKS**					**9**
Security features in 5G networks, network domain security, user domain security, flow based QoS framework, mitigating the threats in 5G.						
					TOTAL HOURS	**45**

TEXT BOOKS:	
1	5G Core networks: Powering Digitalization , Stephen Rommer, Academic Press,2019
2	An Introduction to 5G Wireless Networks : Technology, Concepts and Use cases, Saro Velrajan,First Edition, 2020.
REFERENCES:	
1	5G Simplified: ABCs of Advanced Mobile Communications Jyrki. T.J.Penttinen ,Copyrighted Material
2	5G system Design: An end to end Perspective , Wan Lee Anthony, Springer Publications,2019

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	1	2	-
CO2	2	1	2	-	-	-	-	-	1	1	1	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	1	1	1	-
CO4	2	1	1		-	-	-	-	2	2	1	2	1	2	-
CO5	3	-	-	-	-	-	-	-	2	-	1	2	1	1	-
Average	**2.2**	**1.2**	**1**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1**	**1.8**	**1.2**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**		**Programme Code**			**2071**	
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15035	**SATELLITE COMMUNICATION**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To understand the basics of satellite orbits • To study the space and link design • To study earth segment • To compute the various methods of satellite access • To understand the applications of satellites						
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the concepts of various satellite orbits • Interpret the space segment and link design used in satellites • Describe the various components of earth segments • Apply the knowledge of multiple access techniques in satellite communication systems • Summarize the role of satellite in various applications						
UNIT-I	**SATELLITE ORBITS**						**9**
Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non Geo-stationary orbits – Look Angle Determination- Limits of visibility –eclipse- Sub satellite point –Sun transit outage-launch vehicles and propulsion- Layers of atmosphere.							
UNIT-II	**SPACE SEGMENT AND LINK DESIGN**						**9**
Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command- Transponders- Satellite uplink and downlink Analysis and Design, link budget, E/N calculation							
UNIT-III	**EARTH SEGMENT**						**9**
Introduction – Receive – Only home TV systems – Outdoor unit – Indoor unit for analog (FM) TV – Master antenna TV system – Community antenna TV system – Transmit – Receive earth stations – Equivalent isotropic radiated power – Transmission losses – Free-space transmission – Feeder losses – Antenna misalignment losses – Fixed atmospheric and ionospheric losses							
UNIT-IV	**SATELLITE ACCESS AND CODING METHODS**						**9**
Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast, Multiple access Schemes-TDMA-FDMA-CDMA- Compression – encryption- Coding Schemes							

UNIT-V	SATELLITE APPLICATIONS	9
INTELSAT Series, INSAT, Mobile satellite services: GSM, LEO, MEO, Satellite Navigational System. Principle of GPS Position Location, Direct Broadcast satellites (DBS/DTH)		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Dennis Roddy, "Satellite Communication", 4th Edition, McGraw Hill International, 2006
REFERENCES:	
1	Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, "Satellite Communication Systems Engineering", Prentice Hall/Pearson, 2007
2	N.Agarwal, "Design of Geosynchronous Space Craft", Prentice Hall, 1986
3	Bruce R. Elbert, "The Satellite Communication Applications", Hand Book, Artech House Bostan London, 1997

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	1	-
CO2	2	2	2	-	-	-	-	-	1	1	1	2	1	1	-
CO3	3	2	-	-	-	-	-	-	1	1	2	2	-	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	2	-
CO5	2	2	-	-	-	-	-	-	2	1	2	2	2	1	-
Average	**2.2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.4**	**1.6**	**2**	**1.4**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15036	**AUGMENTED REALITY/VIRTUAL REALITY**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To impart the fundamental aspects and principles of AR/VR technologies. • To know the internals of the hardware and software components involved in the development of AR/VR enabled applications. • To learn about the graphical processing units and their architectures. • To gain knowledge about AR/VR application development. • To know the technologies involved in the development of AR/VR based applications.						
Outcome(s)	**On completion of the course, the students will be able to:** • Explain the basic concepts of AR and VR • Demonstrate the tools and technologies related to AR/VR • Know the working principle of AR/VR related Sensor devices • Design of various models using modeling techniques • Develop AR/VR applications in different domains						
UNIT-I	**INTRODUCTION**						**9**
Introduction to Virtual Reality and Augmented Reality – Definition – Introduction to Trajectories and Hybrid Space-Three I's of Virtual Reality – Virtual Reality Vs 3D Computer Graphics – Benefits of Virtual Reality – Components of VR System – Introduction to AR-AR Technologies-Input Devices – 3D Position Trackers – Types of Trackers – Navigation and Manipulation Interfaces – Gesture Interfaces – Types of Gesture Input Devices – Output Devices – Graphics Display – Human Visual System – Personal Graphics Displays – Large Volume Displays – Sound Displays – Human Auditory System.							
UNIT-II	**VR MODELING**						**9**
Modeling – Geometric Modeling – Virtual Object Shape – Object Visual Appearance – Kinematics Modeling – Transformation Matrices – Object Position – Transformation Invariants –Object Hierarchies – Viewing the 3D World – Physical Modeling – Collision Detection – Surface Deformation – Force Computation – Force Smoothing and Mapping – Behavior Modeling – Model Management.							
UNIT-III	**VR PROGRAMMING**						**9**
VR Programming – Toolkits and Scene Graphs – World ToolKit – Java 3D – Comparison of World Toolkit and Java 3D							

UNIT-IV	APPLICATIONS	9
Human Factors in VR – Methodology and Terminology – VR Health and Safety Issues – VR and Society-Medical Applications of VR – Education, Arts and Entertainment – Military VR Applications – Emerging Applications of VR – VR Applications in Manufacturing – Applications of VR in Robotics – Information Visualization – VR in Business – VR in Entertainment – VR in Education.		
UNIT-V	**AUGMENTED REALITY**	**9**
Introduction to Augmented Reality-Computer vision for AR-Interaction-Modelling and Annotation- Navigation-Wearable devices.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Charles Palmer, John Williamson, "Virtual Reality Blueprints: Create compelling VR experiences for mobile", Packt Publisher, 2018
REFERENCES:	
1	Dieter Schmalstieg, Tobias Hollerer, "Augmented Reality: Principles & Practice", Addison Wesley, 2016
2	JohnVince, "IntroductiontoVirtualReality", Springer-Verlag, 2004.
3	William R.Sherman, Alan B.Craig: Understanding Virtual Reality Interface, Application, Design", Morgan Kaufmann,2003

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	3	2	-
CO2	3	2	2	-	-	-	-	-	1	1	2	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	3	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	2	2	-
CO5	2	2	-	-	-	-	-	-	2	-	2	2	3	2	-
Average	**2.2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.8**	**2**	**2.6**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15037	**MULTIMEDIA AND ANIMATION**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To grasp the fundamental knowledge of Multimedia elements and systems • To get familiar with Multimedia file formats and standards • To learn the process of Authoring multimedia presentations • To learn the techniques of animation in 2D and 3D and for the mobile UI • To explore different popular applications of multimedia						
Outcome(s)	**Upon completion of this course, students will be able to** • Get the bigger picture of the context of Multimedia and its applications • Use the different types of media elements of different formats on content pages • Author 2D and 3D creative and interactive presentations for different target multimedia applications. • Use different standard animation techniques for 2D, 21/2 D, 3D applications • Understand the complexity of multimedia applications in the context of cloud, security, big data streaming, social networking, CBIR etc.,						
UNIT-I	**INTRODUCTION TO MULTIMEDIA**						**9**
Definitions, Elements, Multimedia Hardware and Software, Distributed multimedia systems, challenges: security, sharing / distribution, storage, retrieval, processing, computing. Multimedia metadata, Multimedia databases, Hypermedia, Multimedia Learning.							
UNIT-II	**MULTIMEDIAFILE FORMATSANDSTANDARDS**						**9**
File formats – Text, Image file formats, Graphic and animation file formats, Digital audio and Video file formats, Color in image and video, Color Models. Multimedia data and file formats for the web							
UNIT-III	**MULTIMEDIA AUTHORING**						**9**
Authoring metaphors, Tools Features and Types: Card and Page Based Tools, Icon and Object Based Tools, Time Based Tools, Cross Platform Authoring Tools, Editing Tools, Painting and Drawing Tools, 3D Modeling and Animation Tools, Image Editing Tools, audio Editing Tools, Digital Movie Tools, Creating interactive presentations, virtual learning,							

Simulations.		
UNIT-IV	**ANIMATION**	**9**
Principles of animation: staging, squash and stretch, timing, onion skinning, secondary action, 2D, 2 ½ D, and 3D animation, Animation techniques: Keyframe, Morphing, Inverse Kinematics, Hand Drawn, Character rigging, vector animation, stop motion, motion graphics, , Fluid Simulation, skeletal animation, skinning Virtual Reality, Augmented Reality.		
UNIT-V	**MULTIMEDIAAPPLICATIONS**	**9**
Multimedia Big data computing, social networks, smart phones, surveillance, Analytics, Multimedia Cloud Computing, Multimedia streaming cloud, media on demand, security and forensics, Online social networking, multimedia ontology, Content based retrieval from digital libraries.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Ze-NianLi,MarkS.Drew,JiangchuanLiu,FundamentalsofMultimedia",Third Edition, Springer Texts in ComputerScience,2021.(UNIT-I,II,III)
REFERENCES:	
1	JohnMBlain,The Complete Guide to Blender Graphics:Computer Modeling & Animation, CRCpress,3rd Edition,2016.
2	Gerald Fried land,Ramesh Jain,"Multimedia Computing",CambridgeUniversityPress,2018
3	PrabhatK. Andleigh, Kiran Thakrar, "Multimedia System Design", Pearson Education, 1stEdition,2015.
4	Mohsen Amini Salehi,XiangboLi, "Multimedia Cloud Computing Systems", Springer Nature,1st Edition,2021.
5	Mark Gaimbruno,"3D Graphics and Animation",Second Edition,NewRiders,2002.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	1	-
CO2	2	2	2	-	-	-	-	-	1	1	1	2	1	1	-
CO3	3	2	-	-	-	-	-	-	1	1	2	2	-	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	2	-
CO5	2	2	-	-	-	-	-	-	2	1	2	2	2	1	-
Average	**2.2**	**1.8**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.4**	**1.6**	**2**	**1.4**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15038	**VIDEO CREATION AND EDITING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To introduce the broad perspective of linear and nonlinear editing concepts. • To understand the concept of Storytelling styles. • To be familiar with audio and video recording. To apply different media tools. • To learn and understand the concepts of AVID XPRESS DV 4.. • Learn the projects using AVID XPRESS DV 4						
Outcome(s)	**On completion of the course, the students will be able to:** • Compare the strengths and limitations of nonlinear editing. • Identify the infrastructure and significance of storytelling. • Apply suitable methods for recording to CDs and VCDs. • Address the core issues of advanced editing and training techniques. • Design and develop projects using AVID XPRESS DV 4						
UNIT-I	**FUNDAMENTALS**						**9**
Evolution of filmmaking - linear editing - non-linear digital video - Economy of Expression – risks associated with altering reality through editing.							
UNIT-II	**STORY TELLING**						**9**
Storytelling styles in a digital world through jump cuts, L-cuts, match cuts, cutaways, dissolves, split edits - Consumer and pro NLE systems - digitizing images - managing resolutions - mechanics of digital editing - pointer files - media management							
UNIT-III	**USING AUDIO AND VIDEO**						**9**
Capturing digital and analog video importing audio putting video on exporting digital video to tape recording to CDs and VCDs.							
UNIT-IV	**WORKING WITH FINAL CUTPRO**						**9**
Working with clips and the Viewer - working with sequences, the Timeline, and the canvas – Basic Editing - Adding and Editing Testing Effects - Advanced Editing and Training Techniques - Working with Audio - Using Media Tools - Viewing and Setting Preferences.							
UNIT-V	**WORKINGWITHAVID XPRESS DV4**						**9**

Starting Projects and Working with Project Window - Using Basic Tools and Logging - Preparing to Record and Recording - Importing Files - Organizing with Bins - Viewing and Making Footage - Using Timeline and Working in Trim Mode - Working with Audio - Output Options	
TOTAL HOURS	**45**

TEXT BOOK:	
1	AvidXpress DV4UserGuide,2007.
REFERENCES:	
1	Final Cut Pro6 User Manual,2004.
2	Keith Underdahl,"Digital Video for Dummies",Third Edition,Dummy Series,2001.
3	Robert M. Goodman and Partick M cGarth, "Editing Digital Video: The Complete Creative and Technical Guide", Digital Video and Audio, McGraw– Hill2003.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	1	2	-
CO2	3	-	-	-	-	-	-	-	1	1	2	2	2	2	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	1	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	2	-
CO5	2	2	1	-	-	-	-	-	2	-	2	2	1	2	-
Average	**2.2**	**1.4**	**1**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.8**	**2**	**1.2**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT15039	**DIGITAL MARKETING**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • The primary objective of this module is to examine and explore the role and importance of digital marketing in today's rapidly changing business environment. • It also focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured. • Know the key elements of a digital marketing strategy • To study how the effectiveness of a digital marketing campaign can be measured • Learn the advanced practical skills in common digital marketing tools such as SEO,SEM, Social media and Blogs					
Outcome(s)	**Upon completion of this course, students will be able to** • To examine and explore the role and importance of digital marketing in today'srapidly changing business environment.. • To focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured • Summarize the key elements of a digital marketing strategy • Explain the effectiveness of a digital marketing campaign can be measured • Demonstrate advanced practical skills in common digital marketing tools such as SEO,SEM, Social media and Blogs					
UNIT-I	**INTRODUCTION TOONLINEMARKET**					**9**
Online Market space- Digital Marketing Strategy- Components - Opportunities for building Brand Website - Planning and Creation - Content Marketing						
UNIT-II	**SEARCH ENGINE OPTIMISATION**					**9**
Search Engine optimisation - Keyword Strategy- SEO Strategy - SEO success factors -On-Page Techniques - Off-Page Techniques. Search Engine Marketing- How Search Engine works- SEM components- PPC advertising -Display Advertisement						

UNIT-III	**E-MAIL MARKETING**	**9**
E- Mail Marketing - Types of E- Mail Marketing - Email Automation - Lead Generation - Integrating Email with Social Media and Mobile- Measuring and maximizing email campaign effectiveness. Mobile Marketing- Mobile Inventory/channels- Location based; Context based; Coupons and offers, Mobile Apps, Mobile Commerce, SMS Campaigns-Profiling and targeting		
UNIT-IV	**SOCIAL MEDIAMARKETING**	**9**
Social Media Marketing - Social Media Channels- Leveraging Social media for brand conversations and buzz. Successful /benchmark Social media campaigns. Engagement Marketing- Building Customer relationships - Creating Loyalty drivers - Influencer Marketing		
UNIT-V	**DIGITAL TRANSFORMATION**	**9**
Digital Transformation & Channel Attribution- Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Fundamentals of Digital Marketing by Puneet Singh Bhatia; Publisher: Pearson Education; First edition (July2017); ISBN-10:933258737X;ISBN-13: 978-9332587373.
REFERENCES:	
1	Digital Marketing by Vandana Ahuja ;Publisher: Oxford University Press (April 2015).ISBN-10:0199455449
2	Marketing 4.0: Moving from Traditional to Digital by Philip Kotler; Publisher: Wiley; 1stedition(April2017);ISBN10:9788126566938;ISBN13:9788126566938;ASIN:8126566930.
3	Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation, Kogan PageLimited
4	Barker, Bormann and Neher(2017), Social Media Marketing: AStrategic Approach, 2ESouth- Western,CengageLearning.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	1	1	3	2	-
CO2	2	2	2	-	-	-	-	-	1	1	1	1	1	2	-
CO3	2	1	1	-	-	-	-	-	2	1	1	2	1	1	-
CO4	2	2	1		-	-	-	-	2	2	1	1	2	2	-
CO5	2	2	1	-	-	-	-	-	2	1	1	2	2	1	-
Average	**2**	**1.8**	**1.4**	**-**	**-**	**-**	**-**	**-**	**1.8**	**1.4**	**1**	**1.4**	**1.8**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15040	**GAME DEVELOPMENT**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to:** • To know the basics of 2D and 3D graphics for game development. • To know the stages of game development. • To understand the basics of a game engine. • To survey the gaming development environment and tool kits. • To learn and develop simple games using Pygame environment						
Outcome(s)	**At the end of the course, the student will be able to:** • Explain the concepts of 2D and 3D Graphics • Design game design documents • Implementation of gaming engines. • Survey gaming environments and frameworks. • Implement a simple game in Pygame.						
UNIT-I	**3DGRAPHICS F ORGAMEDESIGN**						**9**
Genres of Games, Basics of 2D and 3D Graphics for Game Avatar, Game Components – 2D and 3D Transformations – Projections – Color Models – Illumination and Shader Models – Animation – Controller Based Animation.							
UNIT-II	**GAME DESIGN PRINCIPLES**						**9**
Character Development, Storyboard Development for Gaming – Script Design – Script Narration, Game Balancing, Core Mechanics, Principles of Level Design – Proposals – Writing for Preproduction, Production and Post – Production							
UNIT-III	**GAME ENGINE DESIGN**						**9**
Rendering Concept – Software Rendering – Hardware Rendering – Spatial Sorting Algorithms – Algorithms for Game Engine– Collision Detection – Game Logic – Game AI – Path finding							
UNIT-IV	**OVERVIEWOFGAMINGPLATFORMSAND FRAMEWORKS**						**9**
Pygame Game development – Unity – Unity Scripts –Mobile Gaming, Game Studio, Unity Single player and Multi-Player games.							
UNIT-V	**GAME DEVELOPMENT USINGPYGAME**						**9**
Developing 2D and 3D interactive games using Pygame – Avatar Creation – 2D and 3D Graphics Programming – Incorporating music and sound – Asset Creations – Game Physics algorithms Development – Device Handling in Pygame – Overview of Isometric and Tile Based arcade							

Games – Puzzle Games.	
TOTAL HOURS	**45**

TEXT BOOK:	
1	SanjayMadhav,"Game Programming Algorithms and Techniques :A Platform Agnostic Approach",AddisonWesley,2013.
REFERENCES:	
1	Will Mc Gugan,"Beginning Game Development with Python and Pygame :From Novice to Professional",Apress,2007
2	Paul Craven,"Python Arcade games",A press Publishers,2016
3	David H.Eberly,"3D Game Engine Design: A Practical Approach to Real-Time Computer Graphics", Second Edition,CRCPress,2006
4	Jung Hyun Han,"3D Graphics for Game Programming", Chapman and Hall /CRC,2011

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	-	-	2	1	3	2	-
CO2	3	-	-	-	-	-	-	-	-	1	2	2	1	2	-
CO3	2	2	1	-	-	-	-	-	-	1	2	1	2	2	-
CO4	2	2	2		-	-	-	-	-	2	2	2	2	1	-
CO5	2	2	1	-	-	-	-	-	-	2	2	1	2	2	-
Average	**2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**1.2**	**2**	**1.4**	**2**	**1.8**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT15041	**MULTIMEDIA DATA COMPRESSION AND STORAGE**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • To understand the basics of compression techniques • To understand the categories of compression for text, image and video • To explore the modalities of text, image and video compression algorithms • To know about basics of consistency of data availability in storage devices • To understand the concepts of data streaming services					
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the basics of text, Image and Video compression • Understand the various compression algorithms for multimedia content • Explore the applications of various compression techniques • Explore knowledge on multimedia storage on disks • Describe scheduling methods for request streams					
UNIT-I	**BASICS OF DATA COMPRESSION**					**9**
Introduction —Lossless and LossyCompression– Basics of Huffmann coding- Arithmetic coding- Dictionary techniques- Context based compression – Applications						
UNIT-II	**IMAGE COMPRESSION**					**9**
Lossless Image compression – JPEG-CALIC-JPEG LS-Prediction using conditional averages – Progressive Image Transmission – Lossless Image compression formats – Applications - Facsimile encoding						
UNIT-III	**VIDEOCOMPRESSION**					**9**
Introduction – Motion Compensation – Video Signal Representation – H.261 – MPEG-1- MPEG-2- H.263.						
UNIT-IV	**DATAPLACEMENTON DISKS**					**9**
Statistical placement on Disks – Striping on Disks – Replication Placement on Disks – Constraint allocation on Disks – Tertiary storage Devices – Continuous Placement on Hierarchical storage system – Statistical placement on Hierarchical storage systems – Constraint allocation on Hierarchical storage system						
UNIT-V	**DISK SCHEDULINGMETHODS**					**9**

Scheduling methods for disk requests – Feasibility conditions of concurrent streams– Scheduling methods for request streams	
TOTAL HOURS	**45**

TEXT BOOKS:	
1	Khalid Sayood, Introduction to Data Compression, Morgan Kaufmann Series in Multimedia Information and Systems, 2018, 5 th Edition.
2	Philip K.C.Tse, Multimedia Information Storage and Retrieval: Techniques andTechnologies,2008
REFERENCES:	
1	David Salomon, A concise introduction to data compression, 2008.
2	Lenald Best, Best's Guide to Live Stream Video Broadcasting, BCB Live Teaching series,2017.
3	Yun-Qing Shi, Image And Video Compression For Multimedia Engineering Fundamentals Algorithms And Standards, Taylor& Francis,2019

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	2	1	-
CO2	2	2	2	-	-	-	-	-	1	1	2	2	1	1	-
CO3	3	-	-	-	-	-	-	-	2	1	2	2	-	2	-
CO4	2	1	2		-	-	-	-	1	1	1	2	1	2	-
CO5	2	2	-	-	-	-	-	-	1	1	2	2	2	1	-
Average	**2.2**	**1.4**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.4**	**1.2**	**1.8**	**2**	**1.4**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**	
22IT15042	**DIGITAL IMAGE PROCESSING**	**L**	**T**	**P**	**C**	**100**	
		3	0	0	3		
Objective(s)	**The student should be made to** • Know about the basic of digital image processing. • Expertise the simple image enhancement techniques in Spatial and Frequency domain. • Learn concepts of degradation function and restoration techniques. • Study the image segmentation and representation techniques. • Familiar with image compression and recognition methods						
Outcome(s)	**Upon completion of this course, students will be able to** • Analyze the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D- transforms. • Elaborate about the techniques of smoothing, sharpening and enhancement in Images. • Demonstratethe restoration concepts and filtering techniques. • Illustrate the concepts of segmentation and features extraction. • Recognize the compression methods for color models.						
UNIT-I	**DIGITAL IMAGE FUNDAMENTALS**					**9**	
Steps in Digital Image Processing–Components–Elements of Visual Perception–Image Sensing And Acquisition–Image Sampling and Quantization–Relationships between pixels- Color image fundamentals -RGB, HSI models, Two-dimensional mathematical preliminaries, 2D transforms - DFT, DCT.							
UNIT-II	**IMAGE ENHANCEMENT**					**9**	
Spatial Domain:Gray level transformations –Histogram processing–Basics of Spatial Filtering– Smoothing and Sharpening Spatial Filtering- Combining Spatial Enhancement Models, Frequency Domain: Introduction to Fourier Transform– Smoothing and Sharpening frequency domain filters– Selective Filtering-Fast Fourier Transform, Color image enhancement.							
UNIT-III	**IMAGE RESTORATION**					**9**	
Image Restoration-degradation model, Properties, Noise models–Mean Filters–Order Statistics– Adaptive filters–Band reject Filter &Band pass Filters–Notch Filters–Optimum Notch Filtering– Inverse Filtering–Wiener filtering-Constrained Linear square Filtering and Geometric Mean Filter-Image Reconstruction from Projections.							
UNIT-IV	**IMAGE SEGMENTATION**					**9**	

Edge detection, Edge linking via Hough transform–Thresholding-Region based segmentation–Region growing–Region splitting and merging–Morphological processing-erosion and dilation-The Hit or Miss Transform, Region segmentation using Clustering and Super Pixels-Segmentation by morphological watersheds–basic concepts–Dam construction–Watershed segmentation algorithm.		
UNIT-V	**IMAGE COMPRESSION AND RECOGNITION**	**9**
Need for data compression, Huffman, Run Length Encoding, Shiftcodes, Arithmetic coding-Golomb coding-LZW coding, Digital Image Watermarking. Boundary representation, Boundary description, Fourier Descriptor, Regional Descriptors –Topological feature, Texture -Patterns and Pattern classes -Recognition based on matching.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	RafaelCGonzalez, RichardE.Woods,DigitalImage Processing', Pearson, Third Edition,2010.
2	Anil K. Jain, Fundamentals of Digital Image Processing', Pearson,2002.
REFERENCES:	
1	J Kenneth R.Castleman,Digital Image Processing',Pearson,2006.
2	Rafael C.Gonzalez, Richard E.Woods,StevenEddins,_Digital Image Processing using MATLAB',Pearson Education,Inc.,2011.
3	D,E.Dudgeon and R M .Mersereau,Multidimensional Digital Signal Processing', Prentice Hall Professional Technical Reference,1990.
4	WilliamK.Pratt, Digital Image Processing',JohnWiley,NewYork,2002
5	Milan Sonkaet al Image processing, analysis and machine vision', Brookes/Cole, Vikas Publishing House,2nd edition,1999

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	2	2	1	2	-
CO2	2	-	-	-	-	-	-	-	1	1	2	2	2	1	-
CO3	2	2	-	-	-	-	-	-	1	1	2	2	1	1	-
CO4	2	1	2		-	-	-	-	2	2	1	2	1	2	-
CO5	2	1	-	-	-	-	-	-	2	-	2	2	1	2	-
Average	**2**	**1.2**	**1.2**	**-**	**-**	**-**	**-**	**-**	**1.6**	**1.2**	**1.8**	**2**	**1.2**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr.S.Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)							
Syllabus							
Department	**Information Technology**	**Programme Code**			**2071**		
Program Elective							
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**	
		L	**T**	**P**	**C**		
22IT15043	**E-LEARNING TECHNIQUES**	3	0	0	3	**100**	
Objective(s)	**The student should be made to:** • To gain knowledge about modern technology for learning. • To be acquainted with e-Learning Tools. • To learn technologies involved in e-learning application development. • To become aware of the current business potential of e-learning based business. • Familiar with E-Learning Techniques						
Outcome(s)	**Upon completion of this course , students will be able to** • Work with technologies involved in e-Learning Applications. • Design and Develop e-Learning Application and working with e-Learning tools. • Explain the technologies involved in e-learning application development. • Explore the current business potential of e-learning based business. • Apply the E-Learning Techniques with real world application						
UNIT-I	**INTRODUCTION**						9
E-Learning - E-Learning cycle - E-Learning types - challenges and opportunities – cognitive presence –Approaches to design E-Learning - E-Learning framework - 6C framework - E-Learning Tools.							
UNIT-II	**E-LEARNING STRATEGY**						9
Role of tutor - E-Learning strategy - Blended E-Learning – M-Learning- problem based learning- Enterprise learning- Corporate Learning- Web based Learning - Pod casting - -Learning Management Systems – Content development process – E-Learning standards- SCORM standard- Managing E-learning quality - Case Studies							
UNIT-III	**PRINCIPLES OF E-LEARNING**						9
Philosophy of E-Learning – theory of learning – Applying principles of multimedia – Applying principles of contiguity - Applying principles of modality - Applying principles of redundancy - Applying principles of coherency - Applying principles of personalization- web-based learning communities - knowledge sharing and Knowledge management in e-learning- social networks and social media in e-learning.							
UNIT-IV	**DESIGN**						9

On line E-Learning technologies – visual communication techniques- Computer-based technologies - Computer-mediated communication (CMC) - Assessment and evaluation- Organizing and designing learning sequences, Characteristics of Interactive Online Learning Media		
UNIT-V	**IMPLEMENTATION**	9
Leverages example in E-Learning – collaborative E-Learning- Learner control in E-Learningguidelines to solve issues in E-Learning – Implementation of an E-Learning Course Content for a complete online course, Research in content retrieval and generation for E-Learning, Role of cloud and semantic Grid in E-Learning.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	D.Randy Garrison "E-Learning in the 21st century a framework for research and practice", 2nd edition, Taylor and Francis, 2011.
2	Robin Mason, "E-Learning: the key concepts", Routledge, 2007.
REFERENCES:	
1	William Horton, "E-Learning by Design", Pfeiffer Wiley, 2006.
2	John Gardner, Bryn Holems, "E-Learning : Concepts and practice" SAGE Publications, 2006.
3	R.C.Clark and R.E.Mayer, "E-Learning and the science of instruction", Pfeiffer Wiley, 2011.
4	Mark J Rosenberg, "E-Learning: strategies for delivering knowledge in the Digital Age", McGraw- Hill, 2001.
5	Kjell E. (Erik) Rudestam , Judith Schoenholtz-Read, "Handbook of Online Learning", Sage Publications Inc., Second Edition, 2009.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	-	2	2	1	2	-
CO2	2	-	-	-	-	-	-	-	2	1	1	1	1	1	-
CO3	2	2	1	-	-	-	-	-	2	2	1	1	2	2	-
CO4	2	2	2		-	-	-	-	2	1	1	2	2	3	-
CO5	2	2	1	-	-	-	-	-	2	2	1	1	2	2	-
Average	**2**	**1.6**	**1.2**	**-**	**-**	**-**	**-**	**-**	**2**	**1.2**	**1.2**	**1.4**	**1.6**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

BoS Chairman
Dr. S. Raju

MAHENDRA ENGINEERING COLLEGE (Autonomous)

DEPARTMENT OF INFORMATION TECHNOLOGY

FS 68172

Regulations 2022

Open Electives

Sl. No.	Course code	Course Title	L	T	P	C	Category
		THEORY					
1	22IT10001	Network Essentials	OE	3	0	0	3
2	22IT10002	Database Management Systems	OE	3	0	0	3
3	22IT10003	Object Oriented Programming	OE	3	0	0	3
4	22IT10004	Python Programming	OE	3	0	0	3
5	22IT10005	Operating Systems	OE	3	0	0	3
6	22IT10006	Data Structures	OE	3	0	0	3
7	22IT10007	Introduction to Artificial Intelligence	OE	3	0	0	3
8	22IT10008	Mobile Application Development	OE	3	0	0	3
9	22IT10009	Introduction to Data Science	OE	3	0	0	3
10	22IT10010	Internet of Things	OE	3	0	0	3
11	22IT10011	Digital Marketing	OE	3	0	0	3
12	22IT10012	Blockchain Technology	OE	3	0	0	3
13	22IT10013	Cryptography & Network Security	OE	3	0	0	3
14	22IT10014	E-Learning Techniques	OE	3	0	0	3
15	22IT10015	Data Mining	OE	3	0	0	3

BoS Chairman
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MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT10001	NETWORK ESSENTIALS	3	0	0	3	100

Objective(s)	**The student should be made to:** • To introduce students to the basic concepts of Computer Networks. • Be familiar with the components required to build different types of networks. • To learn the communication protocols and layered network architecture. • To learn concepts related to network addressing. • To know the design basic network system.
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the basic concepts of Computer Systems work & its principles. • Basics of layered network protocols and cabling. • Describe the routing protocol performance. • Explain the current state of art networking methods. • Explain the Communication interfaces are being accessed and its principles

UNIT-I	**INTRODUCTION**	9
Introduction to Computer Networks –Types of Network – Topology of Network – Reference Models: ISO/OSI - TCP/IP Protocol Suite – Evolution of Internet - Transmission Media: Guided and UnguidedMedia.		
UNIT-II	**TRANSPORT LAYER**	9
Transport Layer Services-Multiplexing and Demultiplexing-UDP-Reliable Data Transfer: Go-Back-N-Selective Repeat-TCP-TCP Congestion Control-Transport Layer Alternatives (RPC)-Transport for Real Time Applications.		
UNIT-III	**NETWORK LAYER**	9
Virtual Circuit and Datagram Networks-Router-Internet Protocol:IPv4 and IPv6-ICMP-Routing Algorithms: Link State Routing-Distance Vector Routing-BGP.		
UNIT-IV	**APPLICATION LAYER**	9
Principles of Network Applications: Network Application Architecture-Processes Communicating-Application Layer Protocols, HTTP-FTP-SMTP-DNS-P2P File Sharing.		
UNIT-V	**LINK LAYER AND ADVANCED NETWORK ESSENTIALS**	9
Introduction-Error-Detection and Correction Techniques-LAN-Ethernet-Hubs and Switches-PPP-Wireless and Mobile Networks: CSMA-Wi-Fi: 802.11 Wireless LANs-Mobile IP-Security: Principles of Cryptography-Digital Signatures-Firewalls-Case Studies.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Larry L. Peterson, Bruce S. Davie, “Computer Networks: A systems approach”, Fifth Edition, Morgan Kaufmann Publishers, 2011.
2	James F. Kurose, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
REFERENCES:	
1	Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
2	Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.
3	Behrouz A. Forouzan, “Data communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011
E-REFERENCES:	
1.	Nptel course, Computer Networks and Internet Protocols. https://onlinecourses.nptel.ac.in/noc20_cs23/unit?unit=50&lesson=52
2.	https://freevideolectures.com/course/2276/computer-networks

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	2	2	2	3	2	-
CO3	3	2	3	-	-	-	-	-	-	2	2	2	3	2	-
CO4	3	3	3	-	-	-	-	-	-	2	2	2	3	2	-
CO5	2	3	2	-	-	-	-	-	-	2	2	2	3	2	-
Average	**2.4**	**2.6**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1.6**	**1.6**	**2.4**	**1.6**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT10002	DATABASE MANAGEMENT SYSTEMS	3	0	0	3	100

Objective(s)	**The student should be made to:** • To learn the fundamental s of data models • To get through knowledge in Relational data model • To learn the Principles and efficient use of storage space using normalization techniques. • To understand the fundamental concepts of transaction Management. • To enhanced data models such as spatial, temporal, multimedia and active databases.
Outcome(s)	**Upon completion of this course , students will be able to** • Summarize the basic concepts of database management systems. • Construct an Entity Relationship diagram for an application. • Construct a relational database model using normalization. • Explain the basic concepts of transaction management. • Appraise how advanced database differ from traditional databases.

UNIT-I	**DATABASE SYSTEM CONCEPTS AND DATA MODELS**	9
Data base approach: Characteristics, Advantages, Applications – Data Models - Three Schema Architecture- Data base System Environment- Data Modeling with ER model- Enhanced ER Model.		
UNIT-II	**RELATIONAL DATA MODEL AND SQL**	9
Relational Algebra-Relational Model: Concepts, Constraints, Schemas – Basic SQL: Data Definition, Data types, Constraint Specification, Data retrieval Queries, Triggers, Views and Schema Modification - ER and EER to Relational mapping.		
UNIT-III	**DATABASE DESIGN AND QUERY PROCESSING**	9
Design Guidelines – Functional Dependencies – Normal Forms based on Primary Keys – Second and Third Normal Forms – BCNF – Multi valued Dependencies and Fourth Normal Form – JoinDependency and Fifth Normal Form-Strategies for Query Processing – Query Optimization.		
UNIT-IV	**TRANSACTION MANAGEMENT**	9
Overview of Database transactions – Transaction states – ACID Properties – Concurrency Control – Need for Concurrency control - Types of locks – Two Phase locking – Deadlock –Time stamp based concurrency control – Recovery techniques – Immediate update – Deferred update – Shadow paging.		
UNIT-V	**NOSQL DATABASES AND ENHANCED DATA MODELS**	9
Introduction to NOSQL Systems: CAP Theorem, Document based systems and MongoDB, NOSQL Key-value stores, Column based and NOSQL Graph Databases- Enhanced Data models: ActiveDatabase, Temporal Database, Spatial, multimedia and Deductive Databases.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Abraham Silberschatz, Henry F. Korth, S. Sudharshan, —Database System Concepts, Sixth Edition, Tata McGrew Hill, 2011.
2	RamezElmasri, Shamkant B Navathe, —Fundamentals of Database Systems, *Seventh Edition, Pearson Education Limited, 2015.*
REFERENCES:	
1	C. J. Date, A.Kannan, Samynathan, An Introduction to Database Systems, Eighth Edition, Pearson Education, 2006.
2	Raghu Ramakrishnan, —Database Management System, Fourth Edition, McGraw-Hill College Publications, 2015.
3	G.K.Gupta,"Database Management Systems, Tata McGraw Hill, 2011.

COs Vs POs and PSOs Mapping

Course Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	1	-
CO2	3	-	-	-	-	-	-	-	-	2	2	2	2	2	-
CO3	3	-	-	-	-	-	-	-	-	2	-	-	1	-	-
CO4	2	2	3	-	-	-	-	-	-	2	2	2	2	2	-
CO5	2	2	2	-	-	-	-	-	-	2	1	1	-	-	-
Average	**2.4**	**1.4**	**1.6**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**1**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

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Syllabus

Department	**Information Technology**	**Programme Code**	**2071**

Open Elective

Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT10003	**OBJECT ORIENTED PROGRAMMING**	3	0	0	3	**100**

Objective(s)	**The student should be made to:** • To learn the concepts of object-oriented programming. • To acquire knowledge and skills in OO design and program development. • To explain the concepts of inheritance and polymorphism. • To learn the syntax, features of, and how to utilize the Standard Template Library • To study the concepts of Packages, Interfaces, Threading and Swing.
Outcome(s)	**Upon completion of this course, students will be able to** • Experience in basic concepts of object-oriented programming. • Know practical knowledge in OO design concepts. • Develop the template and exception handling programs • Write simple example programs using concepts of the standard template library. • Demonstrate the OOP concepts applied in networking and web development. • To implement OOP in various applications.

UNIT-I	**INTRODUCTION**	9

)ject oriented programming concepts –Abstraction and Encapsulation – Inheritance – Abstract classes – Polymorphism- Benefits of OOP– Introduction to C++ – Structure of C++ – Access specifiers – Function and data members –Tokens, Expressions and Control Structures- Data types-storage classes.

UNIT-II	**INHERITANCE**	9

Introduction – Defining derived classes – Single inheritance –Multilevel inheritance-Multiple inheritance- Hierarchical inheritance - Hybrid inheritance – Virtual base classes – Abstract classes – Constructors in derived classes.

UNIT-III	**POLYMORPHISM AND I/O OPERATIONS**	9

Pointers-this pointer- Virtual functions – Pure virtual function – Virtual constructors and destructors– C++ stream classes – Unformatted I/O operations – Formatted I/O operations – File stream operations- Opening and closing a file –File modes – Abstract class – Error handling during file operations.

UNIT-IV	**TEMPLATES AND EXCEPTION HANDLING**	9

Class templates – function templates – overloading of template functions – non-type template arguments – basics of exception handling – mechanism – throwing and catching mechanism – rethrowing an exception – exceptions in constructors and destructors - standard template library - components of STL–containers – algorithms – iterators - application of container classes.

UNIT-V	POINTERS AND MEMORY MODELS	9
Pointers-this pointer-virtual functions –pure virtual function – virtual constructors and destructors– C++ stream classes – Unformatted I/O operations – formatted I/O operations – file stream operations-opening and closing a file –file modes – abstract class – error handling during file operations		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	E.Balagurusamy,"Object Oriented Programming with C++",6th Edition, Tata McGraw Hill Education,ISBN:9781259029936, 2013.
REFERENCES:	
1	B.Trivedi, "Programming with ANSI C++", Oxford University Press, 2007.
2	K.R.Venugopal, Rajkumar, T.Ravishankar, "Mastering C++ ",Tata McGraw Hill, 2007.
3	Robert Lafore, "Object Oriented Programming in Turbo C++", Galgotia Publications, 2006
4	BjarneStroustrup, "The C++ Programming Language", Pearson Education, Fourth Edition, 2013.
5	Matt Weisfeld," Object-Oriented Thought Process", 4th Edition, Pearson Education, ISBN: 9780321861276, 2013.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	2	1	2	2	-	-
CO2	2	3	3	-	-	-	-	-	-	-	1	2	2	1	-
CO3	3	-	-	-	-	-	-	-	-	-	2	-	1	1	-
CO4	3	-	-	-	-	-	-	-	-	-	1	2	3	1	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-	2	2	-
Average	**2.4**	**1**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**1**	**1.2**	**2**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT10004	PYTHON PROGRAMMING	3	0	0	3	100

Objective(s)	**The student should be made to:** • To define python environment and constructs of Python language. • To use Python data structures– list, tuples, dictionaries. • To study Python Modules, packages, files and standard library. • To learn object oriented programming features and exceptions handling mechanism. • To be able to design and build simple Graphical User Interfaces..
Outcome(s)	**Upon completion of this course , students will be able to** • Describe the python environment and constructs of Python language. • Explain the various data structures like list, tuples and dictionaries. • Create own Python Modules, packages, files and standard library. • Illustrate Object oriented Programming features and Exceptionshandling like try, except and else. • Use GUI tools (buttons, labels, entry fields, etc...) for developing specifics applications.

UNIT-I	**INTRODUCTION**	9
Python: Features - Installing - Running – The Basics-variables-Operators and Expressions - Control Flow: introduction– if – else – Iteration: while statement – for loop –break – continue– pass.		
UNIT-II	**PYTHON DATA STRUCTURES AND FUNCTIONS**	9
Functions: Function Parameters, Local and Global Variables – Default Arguments – Keyword Arguments – Return Statement - Data Structures: List – Tuple - Dictionary - Sequence and set.		
UNIT-III	**PYTHON MODULES, PACKAGES AND FILES**	9
Introduction – from import – making own modules – Files and Input/ Output: Open file – Reading and Writing files – Illustrative Programs: Word count – Command line Arguments – Packages.		
UNIT-IV	**OBJECT ORIENTED PROGRAMMING FEATURES AND EXCEPTIONS**	9
Input output - Object Oriented Programming features in Python: Classes - Objects – attributes and methods - Inheritance – polymorphism - Operator Overloading - Errors and Exceptions: try - except and else statements.		
UNIT-V	**GRAPHICAL USER INTERFACE**	9
Simple 2d drawing – colors, shapes – creating simple GUI: buttons – labels – entry fields – dialogs – widget attributes – sizes, fonts, colors layouts, nested frames.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Swaroop C N, " A Byte of Python ", ebshelf Inc., 1st Edition, 2013
REFERENCES:	
1	Guido van Rossum and Fred L. Drake Jr, —An Introduction to Python – Revised and updated for Python 3.2, Network Theory Ltd., 2011
2	Wesley J. Chun, "Core Python Programming", Pearson, 2 nd Edition, 2006.
3	Learning to Program with Python," Richard L. Halterman"., Southern Adventist University
4	T.R. Padmanabhan, Programming with Python, Springer, 1st Ed., 2016.
E-REFERENCES:	
1	Introduction to Python Programming NPTEL video lectures by Dr. SudipMisra , IIT Kharagpur 2017.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	2	-	2	2	2	-
CO3	2	2	2	-	-	-	-	-	-	2	-	2	2	2	-
CO4	2	2	2	-	-	-	-	-	-	2	-	-	-	2	-
CO5	2	-	-	-	-	-	-	-	-	2	-	2	2	-	-
Average	**2**	**1.2**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**1.2**	**1.2**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Information Technology	ProgrammeCode	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT10005	OPERATING SYSTEMS	3	0	0	3	100

Objective(s)	**The student should be made to:** • To understand the structure and functions of OS. • To learn about Processes, Threads and Scheduling algorithms. • To understand the principles of process synchronization and Deadlocks. • To learn various memory management schemes. • To study I/O management and File system.
Outcome(s)	**At the end of the course, the student should be able to** • Explain the basic structure of operating systems. • Design various Scheduling algorithms. • Design deadlock, prevention and avoidance algorithms. • To analyze various memory management schemes. • Design and Implement a prototype file systems.

UNITI	**INTRODUCTION**	**9**

Introduction- Operating system overview-objectives and functions, Evolution of Operating System - Computer System Organization-Operating System Structures- System Interface-System Calls-System programs -OS Generation and Booting an Operating system.

UNITII	**PROCESSES AND THREADS**	**9**

Processes- States-Process Scheduling- Operations on Processes –Inter Process Communication – Threads: Overview, Multithreading models, Threading issues-CPU Scheduling.

UNITIII	**PROCESS SYNCHRONIZATION AND DEADLOCK**	***9***

Process Synchronization: Critical Section - classical two process and n-process solutions - Hardware Support for Synchronization – Semaphores – Monitors-Classic Problems of Synchronization. Deadlocks: prevention- avoidance – detection and recovery.

UNITIV	**MEMORY MANAGEMENT**	**9**

Main Memory-Contiguous Memory Allocation-Paging – Segmentation-Virtual Memory -Demand Paging- Copy-on-Write-Page Replacement algorithms - Allocation of Frames -Thrashing -Memory Compression- Allocating Kernel.

UNITV	**STORAGE MANAGEMENT AND I/O SYSTEMS**	**9**

Mass Storage Structure- Overview, Disk Scheduling and Management; File System Storage-File Concepts, Directory and Disk Structure, Sharing and Protection; File System Implementation- File System Structure, Directory Structure, Allocation Methods, Free Space Management, I/O Systems.

TOTAL HOURS	**45**

TEXT BOOK :	
1	Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, "Operating System Concepts", 9th Edition, John Wiley and Sons Inc., 2012.
REFERENCES:	
1	William Stallings, "Operating Systems – Internals and Design Principles", 7th Edition, Prentice Hall, 2011.
2	Andrew S. Tanenbaum, "Modern Operating Systems", Second Edition, Addison Wesley, 2001.
3	Charles Crowley, "Operating Systems: A Design-Oriented Approach", Tata McGraw Hill Education", 1996.
4	D M Dhamdhere, "Operating Systems: A Concept-Based Approach", Second Edition, Tata McGraw-Hill Education, 2007.
5	Nptel course, Introduction to Operating systems, http://nptel.ac.in/courses/106106144/

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	2	-	2	2	2	-
CO3	2	2	2	-	-	-	-	-	-	1	-	2	2	1	-
CO4	2	1	2	-	-	-	-	-	-	1	-	-	-	2	-
CO5	2	-	-	-	-	-	-	-	-	2	-	2	1	-	-
Average	**2**	**1**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**1.6**	**-**	**1.2**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT10006	DATA STRUCTURES	3	0	0	3	100

Objective(s)	**The student should be made to:** • Introduce the concept of data structures through ADT including List, Stack, and Queues. • To design and implement various data structure algorithms • To apply Tree and Graph structure • To understand sorting, searching and hashing algorithms • To introduce various techniques for representation of the data in the real world.
Outcome(s)	**Upon completion of this course , students will be able to** • Select appropriate data structures as applied to specified problem definition • Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures. • Implement linear and Non-Linear data structures. • Apply appropriate sorting/searching technique for given problem. • Design advance data structure using Nonlinear data structure.

UNIT-I	**LINEAR DATA STRUCTURES – LIST**	**9**
Abstract Data Types (ADTs) – List ADT – array-based implementation – linked list implementation –singly linked lists- circularly linked lists- doubly-linked lists – applications of lists –Polynomial Manipulation.		
UNIT-II	**LINEAR DATA STRUCTURES – STACKS, QUEUES**	**9**
Stack ADT – Operations – Applications – Evaluating arithmetic expressions- Conversion of Infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue – applications of queues.		
UNIT-III	**NON LINEAR DATA STRUCTURES – TREES**	**9**
Tree ADT – tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – AVL Trees – B-Tree – Heap – Applications of heap.		
UNIT-IV	**NON LINEAR DATA STRUCTURES – GRAPHS**	**9**
Definition – Representation of Graph – Types of graph – Breadth-first traversal – Depth-first traversal – Topological Sort – Bi-connectivity – Cut vertex – Euler circuits – Applications of graphs.		
UNIT-V	**SEARCHING, SORTING AND HASHING TECHNIQUES**	**9**
Searching- Linear Search – Binary Search. Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort. Hashing- Hash Functions – Separate Chaining – Open Addressing – Rehashing – Extendible Hashing.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	ReemaThareja, “Data Structures Using C”, Second Edition , Oxford University Press, 2011
2	Mark Allen Weiss, “Data Structures and Algorithm Analysis in C”, 2nd Edition, Pearson Education,2002.
REFERENCES:	
1	Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, “Introduction to Algorithms”, Second Edition, Mcgraw Hill, 2002.
2	Aho, Hopcroft and Ullman, “Data Structures and Algorithms”, Pearson Education,1983.
3	Stephen G. Kochan, “Programming in C”, 3rd edition, Pearson Education.
4	Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Second Edition, University Press, 2008
5.	https://nptel.ac.in/courses/106102064/data structures and algorithms.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	-	-	-	-	-	-	-	-	2	2	-	-	-	-
CO2	2	2	2	-	-	-	-	-	-	2	2	-	2	2	-
CO3	2	3	3	-	-	-	-	-	-	2	3	-	3	3	-
CO4	2	3	3	-	-	-	-	-	-	2	3	3	3	3	-
CO5	2	3	3	-	-	-	-	-	-	2	3	3	3	2	-
Average	**2**	**2.2**	**2.2**	**-**	**-**	**-**	**-**	**-**	**-**	**2**		**1.2**	**1.2**	**1.2**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**				**2071**
Open Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
22IT10007	**INTRODUCTION TO ARTIFICIAL INTELLIGENCE**	**L**	**T**	**P**	**C**	**100**
		3	0	0	3	
Objective(s)	**The student should be made to:** • Study the concepts of Artificial Intelligence • Learn the methods of solving problems using Artificial Intelligence • Introduce the concepts of Expert Systems and machine learning • To apply Artificial Intelligence techniques for K-strips • To apply Artificial Intelligence techniques of empirical evaluation of different algorithms on a problem formalisation,					
Outcome(s)	**Upon completion of this course, students will be able to** • Identify problems that are amenable to solution by AI methods. • Identify appropriate AI methods to solve a given problem. • Formalise a given problem in the language/framework of different AI methods. • Implement basic AI algorithms. • Design and carry out an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.					
UNIT-I	**INTRODUCTION TO Al AND PRODUCTION SYSTEMS**					**9**
Introduction to AI-Problem formulation- Problem Definition -Production systems- Control strategies- Search strategies. Problem characteristics- Production system characteristics -Specialized production system- Problem solving methods - Problem graphs- Matching- Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first.						
UNIT-II	**REPRESENTATION OF KNOWLEDGE**					**9**
Game playing - Knowledge representation- Knowledge representation uses Predicate logic- Introduction to predicate calculus- Resolution- Use of predicate calculus- Knowledge representation using other logic-Structured representation of knowledge.						
UNIT-III	**KNOWLEDGE INFERENCE**					**9**
Knowledge representation -Production based system- Frame based system. Inference - Backward chaining- Forward chaining- Rule value approach- Fuzzy reasoning - Certainty factors- Bayesian Theory-Bayesian Network-Dempster - Shafer theory.						
UNIT-IV	**PLANNING**					**9**
Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations.						
UNIT-V	**EXPERT SYSTEMS**					**9**
Expert systems - Architecture of expert systems- Roles of expert systems - Knowledge Acquisition –Meta knowledge- Heuristics. Typical expert systems - MYCIN, DART, Expert systems shells.						
					TOTAL HOURS	**45**

TEXT BOOKS:	
1	Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, McGraw Hill- 2008. .
2	Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007.
REFERENCES:	
1	Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.
2	Stuart Russel and Peter Norvig “AI – A Modern Approach”, 3rd Edition, Pearson Education 2016.
3	Deepak Khemani “Artificial Intelligence”, Tata Mc Graw Hill Education 2013.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	3	-	-	-	-	-	-	2	-	-	-	-	1	-	-
CO2	2	3	1	-	-	-	-	2	-	2	-	-	2	-	-
CO3	3	-	-	-	-	-	-	1	-	2	-	-	2	-	-
CO4	2	2	3	-	-	-	-	2	-	2	-	-	2	-	-
CO5	2	-	1	-	-	-	-	2	-	2	-	-	2	-	-
Average	**2.4**	**1**	**1**	**-**	**-**	**-**	**-**	**1.8**	**-**	**1.6**	**-**	**-**	**1.8**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum Marks
		L	T	P	C	
22IT10008	MOBILE APPLICATION DEVELOPMENT	3	0	0	3	100

Objective(s)	**The student should be made to:** • Understand how to work in the Android environment • Developing mobile applications using one application development framework. • Learn other mobile application design techniques • Understanding enterprise scale requirements of mobile applications • To Learn the mobile applications using one application development framework
Outcome(s)	**Upon completion of this course- the studentwill be able to do:** • Be exposed to technology and business trends impacting mobile applications • Be competent with the characterization and architecture of mobile applications. • Be competent with understanding enterprise scale requirements of mobile applications • Be competent with designing and developing mobile applications using one application development framework.

UNIT-I	**INTRODUCTION**	**9**

What is Android, Android versions and its feature set The various Android devices on the market , The Android Market application store ,Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs).

UNIT-II	**UNDERSTANDING ANDROID VIEWS, VIEW GROUPS AND LAYOUTS**	**9**

Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool

UNIT-III	**GRAPHICAL USER INTERFACE SCREEN WITH VIEWS**	**9**

Displaying Text with TextView, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users, Adjusting Progress with SeekBar, Working with Menus using view.

UNIT-IV	**ANDROID FRAMEWORK OVERVIEW**	**9**

Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for ComponentsAndroid Manifest XML: Declaring Your Components.

UNIT-V	A BASIC OVERVIEW OF ANDROID THREADS AND THREAD HANDLERS	9
An Overview of Threads, The Application Main Thread, Thread Handlers, A Basic Threading Example, Creating a New Thread, Implementing a Thread Handler, Passing a Message to the Handler.		
	TOTAL HOURS	**45**

TEXT BOOKS :	
1	Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 3rd edition, 2017;
2	Rajiv Ramnath, Roger Craws, and Paolo Sivilotti, Android SDK 3 for Dummies, Wiley 2015
REFERENCES:	
1	Tomasz Nurkiewicz and Ben Christensen, Reactive Programming with RxJava, O'Reilly Media, 2016;
2	Christian Keur and Aaron Hillegass, iOS Programming: The Big Nerd Ranch Guide, 6th edition, 2016;
3	Valentino Lee, Heather Schneider, and Robbie Schell, Mobile Applications: Architecture, Design and Development, Prentice Hall, 2004;

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	1	2	-	-	-	-	-	2	2	-	-	2	2	-
CO2	2	2	-	-	-	-	-	-	2	2	2	2	2	2	-
CO3	2	2	1	-	-	-	-	-	1	2	2	2	2	3	-
CO4	2	2	2	-	-	-	-	-	2	2	-	-	3	2	-
CO5	2	1	-	-	-	-	-	-	1	2	2	2	3	3	-
Average	**2**	**1.6**	**1**	**-**	**-**	**-**	**-**	**-**	**1.6**	**2**	**1.2**	**1.2**	**2.4**	**2.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE
(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT10009	INTRODUCTION TO DATA SCIENCE	3	0	0	3	100

Objective(s)	**Thestudentshouldbemadeto:** •Will gain knowledge in the basic concepts of Data Analysis •To acquire skills in data preparatory and preprocessing steps • To learn the tools and packages in Python for data science • To gain understanding in classification and Regression Model • To acquire knowledge in data interpretation and visualization techniques.
Outcome(s)	**Upon completion of this course , students will be able to** • Apply the skills of data inspecting and cleansing. • Determine the relationship between data dependencies using statistics • Can handle data using primary tools used for data science in Python • Represent the useful information using mathematical skills • Can apply the knowledge for data describing and visualization using tools.

UNIT-I	**INTRODUCTION**	9

Need for data science – benefits and uses – facets of data – data science process – setting the research goal – retrieving data – cleansing, integrating, and transforming data – exploratory data analysis – build the models – presenting and building applications

UNIT-II	**DESCRIBING DATA I**	9

Frequency distributions – Outliers – relative frequency distributions – cumulative frequency distributions – frequency distributions for nominal data – interpreting distributions – graphs – averages – mode – median – mean – averages for qualitative and ranked data – describing variability – range – variance – standard deviation – degrees of freedom – interquartile range – variability for qualitative and ranked data

UNIT-III	**PYTHON FOR DATA HANDLING**	9

Basics of Numpy arrays – aggregations – computations on arrays – comparisons, masks, boolean logic – fancy indexing – structured arrays – Data manipulation with Pandas – data indexing and selection – operating on data – missing data – hierarchical indexing – combining datasets – aggregation and grouping – pivot tables

UNIT-IV	**DESCRIBING DATA II**	9

Normal distributions – z scores – normal curve problems – finding proportions – finding scores – more about z scores – correlation – scatter plots – correlation coefficient for quantitative data – computational formula for correlation coefficient – regression – regression line – least squares regression line – standard error of estimate – interpretation of r2 – multiple regression equations – regression toward the mean

UNIT-V	**PYTHON FOR DATA VISUALIZATION**	9

Visualization with matplotlib – line plots – scatter plots – visualizing errors – density and contour plots – histograms, binnings, and density – three dimensional plotting – geographic data – data

analysis using statmodels and seaborn – graph plotting using Plotly – interactive data visualization using Bokeh	
TOTAL HOURS	**45**

TEXT BOOKS :	
1	David Cielen, Arno D. B. Meysman, and Mohamed Ali, “Introducing Data Science”, Manning Publications, 2016
2	Robert S. Witte and John S. Witte, “Statistics”, Eleventh Edition, Wiley Publications, 2017.
REFERENCES:	
1	Allen B. Downey, “Think Stats: Exploratory Data Analysis in Python”, Green Tea Press, 2014
2	Jake VanderPlas, “Python Data Science Handbook”, O’Reilly, 2016
3	Rupam Kumar Sharma Gypsy Nandi,” Data Science Fundamentals And Practical Approaches”, BPB Publications 2020

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	1	2	-	-	-	-	-	2	2	-	-	2	2	-
CO2	3	-	-	-	-	-	-	-	2	2	2	2	3	3	-
CO3	3	-	-	-	-	-	-	-	2	2	2	2	3	3	-
CO4	2	3	3	-	-	-	-	-	2	2	-	-	3	2	-
CO5	2	1	-	-	-	-	-	-	2	2	2	2	3	3	-
Average	**2.4**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**1.2**	**1.2**	**2.8**	**2.6**	**-**

1 - Low, 2 - Medium, 3 - High, ‘-“- No Correlation

MAHENDRA ENGINEERING COLLEGE(Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Open Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT10010	**INTERNET OF THINGS**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • To Understand the Architectural Overview of IoT • To Understand the IoT Reference Architecture and RealWorld Design Constraints • To learn about various IOT-relatedprotocols • To build simple IoT Systems using Arduino and RaspberryPi. • To develop IoT infrastructure for popularapplications					
Outcome(s)	**Upon completion of this course , students will be able to** • Explain the concepts of Internet of Things • Analyze basic protocols in wireless sensor network • Design IoT applications in different domain and be able to analyze their performance • Implement basic IoT applications on embedded platform • Analyze applications of IoT in real timescenario					
UNIT-I	**FUNDAMENTALSOF IoT**					9
Evolution of Internet of Things - Enabling Technologies – IoT Architectures: oneM2M, IoTWorld Forum (IoTWF) and Alternative IoT models – Simplified IoT Architecture and Core IoT Functional Stack -– Fog, Edge and Cloud in IoT – Functional blocks of an IoT ecosystem – Sensors, Actuators, Smart Objects and Connecting Smart Objects.						
UNIT-II	**IoTPROTOCOLS**					9
IoT Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.4g, 802.15.4e, 1901.2a, 802.11ah and LoRaWAN – Network Layer: IP versions, Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo, Routing over Low Power and Lossy Networks – Application Transport Methods: Supervisory Control and Data Acquisition – Application Layer Protocols: CoAP and MQTT.						
UNIT-III	**DESIGNAND DEVELOPMENT**					9
Design Methodology - Embedded computing logic - Microcontroller, System on Chips - IoT system building blocks - Arduino - Board details, IDE programming - Raspberry Pi - Interfaces and Raspberry Pi with Python Programming.						
UNIT-IV	**DATA ANALYTICS AND SUPPORTINGSERVICES**					9
Structured Vs Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Xively Cloud for IoT, Python Web Application Framework – Django – AWS for IoT – System Management withNETCONF-YANG.						
UNIT-V	**CASE STUDIES/INDUSTRIALAPPLICATIONS**					9
Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plantwide Ethernet Model (CPwE) – Power Utility Industry – GridBlocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart TrafficControl.						
					TOTAL HOURS	**45**

TEXT BOOK:	
1	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017
REFERENCES:	
1	ArshdeepBahga, Vijay Madisetti, -Internet of Things – A hands-on approach, Universities Press,2015.
2	OlivierHersent,DavidBoswarthick,OmarElloumi,-TheInternetofThings–Keyapplicationsand Protocols, Wiley, 2012 (for Unit2).
3	Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, "From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence", Elsevier,2014.
4	Dieter Uckelmann, MarkHarrison, Michahelles, Florian (Eds), -Architecting theInternetofThings‖, Springer, 2011.
5	Michael Margolis, Arduino Cookbook, Recipes to Begin, Expand, and Enhance Your Projects, 2nd Edition, O'Reilly Media,2011. https://www.arduino.cc/https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	-	-	-	-	-	2	-	1	2	2	1	-	-
CO2	2	3	-	-	-	-	-	2	-	2	2	1	2	-	-
CO3	2	3	3	-	-	-	-	2	-	-	2	2	-	2	-
CO4	3	-	-	-	-	-	-	2	-	3	2	2	2	2	-
CO5	2	3	3	-	-	-	-	2	-	-	2	2	-	2	-
Average	**2.4**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**1.2**	**1.2**	**2.8**	**2.6**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Program Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
22IT10011	**DIGITALMARKETING**	**L**	**T**	**P**	**C**	**100**
		3	0	0	3	
Objective(s)	**The student should be made to:** • The primary objective of this module is to examine and explore the role and importance of digital marketing in today's rapidly changing business environment. • It also focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured. • Know the key elements of a digital marketing strategy • To study how the effectiveness of a digital marketing campaign can be measured • Learn the advanced practical skills in common digital marketing tools such as SEO,SEM, Social media and Blogs					
Outcome(s)	**Upon completion of this course, students will be able to** • To examine and explore the role and importance of digital marketing in today'srapidly changing business environment.. • To focuses on how digital marketing can be utilized by organizations and how its effectiveness can be measured • Summarize the key elements of a digital marketing strategy • Explain the effectiveness of a digital marketing campaign can be measured • Demonstrate advanced practical skills in common digital marketing tools such as SEO,SEM, Social media and Blogs					
UNIT-I	**INTRODUCTION TOONLINEMARKET**					**9**
Online Market space- Digital Marketing Strategy- Components - Opportunities for building Brand Website - Planning and Creation - Content Marketing						
UNIT-II	**SEARCH ENGINE OPTIMISATION**					**9**
Search Engine optimisation - Keyword Strategy- SEO Strategy - SEO success factors -On-Page Techniques - Off-Page Techniques. Search Engine Marketing- How Search Engine works- SEM components- PPC advertising -Display Advertisement						
UNIT-III	**E-MAIL MARKETING**					**9**
E- Mail Marketing - Types of E- Mail Marketing - Email Automation - Lead Generation - Integrating Email with Social Media and Mobile- Measuring and maximizing email campaign effectiveness. Mobile Marketing- Mobile Inventory/channels- Location based; Context based; Coupons and offers, Mobile Apps, Mobile Commerce, SMS Campaigns-Profiling and targeting						
UNIT-IV	**SOCIAL MEDIAMARKETING**					**9**
Social Media Marketing - Social Media Channels- Leveraging Social media for brand conversations and buzz. Successful /benchmark Social media campaigns. Engagement						

Marketing- Building Customer relationships - Creating Loyalty drivers - Influencer Marketing		
UNIT-V	**DIGITAL TRANSFORMATION**	**9**
Digital Transformation & Channel Attribution- Analytics- Ad-words, Email, Mobile, Social Media, Web Analytics - Changing your strategy based on analysis- Recent trends in Digital marketing.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1	Fundamentals of Digital Marketing by Puneet Singh Bhatia; Publisher: Pearson Education; First edition (July2017); ISBN-10:933258737X;ISBN-13:
REFERENCES:	
1	Digital Marketing by VandanaAhuja ;Publisher: Oxford University Press (April 2015).ISBN-10:0199455449
2	Marketing 4.0: Moving from Traditional to Digital by Philip Kotler;Publisher: Wiley; 1stedition(April2017);ISBN10:9788126566938;ISBN13:9788126566938;ASIN:8126566930.
3	Ryan, D. (2014). Understanding Digital Marketing: Marketing Strategies for Engaging theDigitalGeneration,Kogan PageLimited
4	Barker,Barker,BormannandNeher(2017),SocialMediaMarketing:AStrategicApproach,2ESouth-Western,CengageLearning.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	2	2	-	-	-	-	-	2	2	1	1	3	2	-
CO2	2	2	2	-	-	-	-	-	1	1	1	1	1	2	-
CO3	2	1	1	-	-	-	-	-	2	1	1	2	1	1	-
CO4	2	2	1		-	-	-	-	2	2	1	1	2	2	-
CO5	2	2	1	-	-	-	-	-	2	1	1	2	2	1	-
Average	**2**	**1.8**	**1.4**	**-**	**-**	**-**	**-**	**-**	**1.8**	**1.4**	**1**	**1.4**	**1.8**	**2**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
OpenElective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum Marks**
		L	**T**	**P**	**C**	
22IT10012	**BLOCKCHAIN TECHNOLOGY**	3	0	0	3	**100**
Objective(s)	**The students will be made to** • Learn Blockchain's fundamental components and decentralization using block chain. • Know the working procedures of cryptocurrency. • Familiarize the components of Ethereum and Programming Languages for Ethereum. • Expertise with the concepts of Hyperledger and Web3. • Gain knowledge about alternative Blockchains and Block chain projects.					
Outcome(s)	**Upon completion of this course, students will be able to** • Explain the technology components of Blockchain and how it works behind the scenes. • Identify different approaches to developing decentralized applications. • Discuss Bitcoin and its limitations by comparing with other alternative coins. • Compare and contrast Hyperledger and Web3. • Illustrate the use of Hyperledger and its development framework.					
UNIT-I	**INTRODUCTION TO BLOCKCHAIN**					9
History of Blockchain – Types of Blockchain – Consensus –Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain. Decentralization using Blockchain – Blockchain and Full Ecosystem Decentralization – Platforms for Decentralization.						
UNIT-II	**BITCOIN AND CRYPTOCURRENCY**					9
Bitcoin – Digital Keys and Addresses – Transactions – Mining – Bitcoin Networks and Payments – Wallets –Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency-Smart Contracts – Ricardian Contracts.						
UNIT-III	**ETHEREUM**					9
The Ethereum Network – Components of Ethereum Ecosystem –Metamask Setup, Ethereum Accounts, Transactions, Receiving Ethers- Ethereum Programming Languages: Runtime Byte Code, Blocks and Blockchain, Fee Schedule – Supporting Protocols – Solidity Language.						

UNIT-IV	WEB3 AND HYPERLEDGER	9
Introduction to Web3 – Contract Deployment – POST Requests – Development Frameworks – Hyperledger as a Protocol – The Reference Architecture – Hyperledger Fabric – Distributed Ledger – Corda.		
UNIT-V	**ALTERNATIVE BLOCKCHAINS AND APPLICATIONS**	9
Kadena – Ripple – Rootstock – Quorum – Tendermint – Scalability – Privacy –Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain.		
	TOTAL HOURS	**45**

TEXT BOOK:	
1.	Imran Bashir, "Mastering Blockchain: Distributed Ledger Technology, Decentralization and Smart Contracts Explained", Second Edition, Packt Publishing, 2018.
2.	Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction" Princeton University Press, 2016
REFERENCES:	
1	ArshdeepBahga, Vijay Madisetti, "Blockchain Applications: A Hands On Approach", VPT, 2017.
2	Andreas Antonopoulos, Satoshi Nakamoto, "Mastering Bitcoin", O'Reilly, 2014.
3	Roger Wattenhofer, "The Science of the Blockchain" CreateSpace Independent Publishing, 2016.
4	A. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder, "Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction", Princeton University Press, 2016.
5	Alex Leverington, "Ethereum Programming" Packt Publishing, 2017.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	3	2	-	-	-	-	-	-	1	-	-	2	1	-
CO2	2	2	2	-	-	-	-	-	-	1	-	2	2	-	-
CO3	2		2	-	-	-	-	-	-	2	-	2	-	2	-
CO4	3	-	-		-	-	-	-	-	2	-	-	1	1	-
CO5	3	-	-	-	-	-	-	-	-	2	-	1	-	1	-
Average	**2.4**	**1**	**1.2**	**-**	**-**	**-**	**-**	**-**	**-**	**1.6**	**-**	**1**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE

(Autonomous)

Syllabus

Department	Information Technology	Programme Code	2071

Open Elective

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P	C	
22IT10013	CRYPTOGRAPHY AND NETWORK SECURITY	3	0	0	3	100

Objective(s)	**The student should be made to:** • To understand the fundamentals of cryptography and number theory. • To use the standard security algorithms to provide confidentiality, integrity and authentication for any applications. • To make use of application protocols to design and manage a secure system. • To learn the configuration and manage Firewall and WLAN Security. • To understand the importance of system security and its vulnerabilities.
Outcome(s)	**Upon completion of this course , students will be able to** • Apply the basic security algorithms and policies required for a computing system. • Predict the vulnerabilities across any computing system and hence be able to designsecurity solution for any computing system. • To identify any network security issues and resolve the issues. • To manage the firewall and WLAN security. • Evaluate the system related vulnerabilities and mitigation. • To design secured web applications in real-time.

UNIT-I	INTRODUCTION TO SECURITY AND NUMBER THEORY	9

Basics of Security – CIA Triad – Threats, Attacks and Services – Classical Cryptography – Substitution – Transposition – One-time Pad – Cryptanalysis – Number Theory – ModularArithmetic – Euclidean Theorem – Extended Euclidean Theorem – Algebraic Structures –Galois Field – Prime Numbers – Fermat's Theorem – Euler's Phi function – Euler's Theorem– Chinese Remainder theorem – Modular Exponentiation –Logarithms – Elliptic CurveArithmetic.

UNIT-II	SYMMETRIC CRYPTOGRAPHY	9

Modern Cryptography – Symmetric Cipher – Block and Stream Cipher – Feistel Ciphers –Data Encryption Standard (DES) – DES Structure – Key Generation – Simplified DES –Linear and Differential cryptanalysis –Triple DES – Advanced Encryption Standard (AES) –Basic Structure – Transformations – Key Expansions Process – Analysis of AES – Modes ofoperation – RC4.

UNIT-III	ASYMMETRIC KEY CRYPTOGRAPHY	9

Public Key Cryptosystems – RSA Algorithm – ElGamal Cryptosystems – Diffie-Hellman key exchange – Elliptic curve cryptography – Hash functions – Hash algorithms – Secure Hash Algorithm SHA – MD5 – Message Authentication Codes – Quantum Cryptography – Quantum Key Distribution – Threshold Cryptography.

UNIT-IV	SECURITY APPLICATIONS	9

Digital Signatures Schemes– Digital Certificate – Key Management – Kerberos – KeyAgreement and Distribution – PKI – X.509 Certificate – E-Mail Security – PGP – S/MIME –IP security – Virtual Private Network (VPN) – Web Security – Secure Socket Layer (SSL) –Transport Layer Security – Secure Electronic Transaction (SET) – Blockchain.

UNIT-V	FIREWALL & WIRELESS SECURITY	9
Buffer Overflow and Malicious Software – Password Management – Introduction to Firewall – Firewall Generations – Intrusion Detection System – Types of IDS – Intrusion Prevention System – Wireless LAN – Wireless LAN Security – Network Access Control and Cloud Security.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	William Stallings, "Cryptography and Network security Principles and Practices", Pearson/PHI, Seventh Edition, 2017.
2	BehourzForouzan, DebdeepMukhopadyay, "Cryptography and Network Security", Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2010.
REFERENCES:	
1	Wenbo Mao, "Modern Cryptography Theory and Practice", Pearson Education, 2004.
2	Pfleeger and Pfleeger, "Security in computing", Third Edition , PHI/Pearson, 2003.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	3	2	-	-	-	-	-	-	1	2	-	2	1	-
CO2	2	2	1	-	-	-	-	-	-	1	2	2	2	-	-
CO3	2		2	-	-	-	-	-	-	2	1	2	-	2	-
CO4	3	-	1		-	-	-	-	-	1	2	-	1	1	-
CO5	3	-	2	-	-	-	-	-	-	2	1	1	-	1	-
Average	**2.4**	**1**	**1.6**	**-**	**-**	**-**	**-**	**-**	**-**	**1.4**	**1.6**	**1**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Open Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
		L	**T**	**P**	**C**	
22IT10014	**E-LEARNING TECHNIQUES**	3	0	0	3	**100**
Objective(s)	**The student should be made to:** • To gain knowledge about modern technology for learning. • To be acquainted with e-Learning Tools. • To learn technologies involved in e-learning application development. • To become aware of the current business potential of e-learning based business. • Familiar with E-Learning Techniques					
Outcome(s)	**Upon completion of this course , students will be able to** • Work with technologies involved in e-Learning Applications. • Design and Develop e-Learning Application and working with e-Learning tools. • Explain the technologies involved in e-learning application development. • Explore the current business potential of e-learning based business. • Apply the E-Learning Techniques with real world application					
UNIT-I	**INTRODUCTION**					9
E-Learning - E-Learning cycle - E-Learning types - challenges and opportunities – cognitive presence –Approaches to design E-Learning - E-Learning framework - 6C framework - E-Learning Tools.						
UNIT-II	**E-LEARNING STRATEGY**					9
Role of tutor - E-Learning strategy - Blended E-Learning – M-Learning- problem based learning- Enterprise learning- Corporate Learning- Web based Learning - Pod casting - -Learning Management Systems – Content development process – E-Learning standards- SCORM standard- Managing E-learning quality - Case Studies						
UNIT-III	**PRINCIPLES OF E-LEARNING**					9
Philosophy of E-Learning – theory of learning – Applying principles of multimedia – Applying principles of contiguity - Applying principles of modality - Applying principles of redundancy - Applying principles of coherency - Applying principles of personalization- web-based learning communities - knowledge sharing and Knowledge management in e-learning- social networks and social media in e-learning.						

UNIT-IV	DESIGN	9
On line E-Learning technologies – visual communication techniques- Computer-based technologies - Computer-mediated communication (CMC) - Assessment and evaluation- Organizing and designing learning sequences, Characteristics of Interactive Online Learning Media		
UNIT-V	**IMPLEMENTATION**	9
Leverages example in E-Learning – collaborative E-Learning- Learner control in E-Learningguidelines to solve issues in E-Learning – Implementation of an E-Learning Course Content for a complete online course, Research in content retrieval and generation for E-Learning, Role of cloud and semantic Grid in E-Learning.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	D.Randy Garrison "E-Learning in the 21st century a framework for research and practice", 2nd edition, Taylor and Francis, 2011.
2	Robin Mason, "E-Learning : the key concepts", Routledge, 2007.
REFERENCES:	
1	William Horton, "E-Learning by Design", Pfeiffer Wiley, 2006.
2	John Gardner, Bryn Holems, "E-Learning : Concepts and practice" SAGE Publications, 2006.
3	R.C.Clark and R.E.Mayer, "E-Learning and the science of instruction", Pfeiffer Wiley, 2011.
4	Mark J Rosenberg, "E-Learning: strategies for delivering knowledge in the Digital Age", McGraw- Hill, 2001.
5	Kjell E. (Erik) Rudestam , Judith Schoenholtz-Read, "Handbook of Online Learning", Sage Publications Inc., Second Edition, 2009.

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	1	-	-	-	-	-	2	-	2	3	2	1	-
CO2	2	1	-	-	-	-	-	-	2	-	2	2	3	2	-
CO3	2	-	2	-	-	-	-	-	2	-	2	2	1	1	-
CO4	2	2	-	-	-	-	-	1	2	2	2	2	1	1	-
CO5	2	2	2	-	-	-	-	-	2	2	2	2	2	2	-
Average	**2.4**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**1.6**	**2**	**1**	**1**	**1**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation

MAHENDRA ENGINEERING COLLEGE (Autonomous)						
Syllabus						
Department	**Information Technology**	**Programme Code**			**2071**	
Open Elective						
Course code	**Course Name**	**Hours/week**			**Credit**	**Maximum marks**
22IT10015	**DATA MINING**	**L**	**T**	**P**	**C**	**100**
		3	0	0	3	
Objective(s)	**The student should be made to:** • To understand data warehouse concepts, architecture, business analysis and tools • To understand data pre-processing and data visualization techniques. • To study algorithms for finding hidden and interesting patterns in data • To understand and apply various classification and clustering techniques using tools. • To develop research interest towards advances in data mining Tools.					
Outcome(s)	**Upon completion of this course , students will be able to** • Design a Data warehouse system and perform business analysis with OLAP tools. • Apply suitable pre-processing and visualization techniques for data analysis • Apply frequent pattern and association rule mining techniques for data analysis • Apply appropriate classification and clustering techniques for data analysis. • Benefit the user experiences towards research and innovation. Integration.					
UNIT-I	**DATA WAREHOUSING, BUSINESS ANALYSIS AND ON-LINE ANALYTICAL PROCESSING**					9
Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model – Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems –OLAP and OLTP.						
UNIT-II	**DATA MINING – INTRODUCTION**					9
Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.						
UNIT-III	**DATA MINING – FREQUENT PATTERN ANALYSIS**					9
Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.						
UNIT-IV	**CLASSIFICATION AND CLUSTERING**					9
Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines —Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods .						

UNIT-V	WEKA TOOL	9
Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.		
	TOTAL HOURS	**45**

TEXT BOOKS:	
1	Jiawei Han and MichelineKamber, —Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.
REFERENCES:	
1	Alex Berson and Stephen J.Smith, —Data Warehousing, Data Mining & OLAP, Tata McGraw – Hill Edition, 35th Reprint 2016.
2	K.P. Soman, ShyamDiwakar and V. Ajay, —Insight into Data Mining Theory and Practice, Eastern Economy Edition, Prentice Hall of India, 2006.
3	Ian H.Witten and Eibe Frank, —Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.
4.	https://nptel.ac.in/courses/106105174/data mining

COs Vs POs and PSOs Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1	2	-	1	-	-	-	-	-	2	-	2	1	2	1	-
CO2	2	1	-	-	-	-	-	-	1	2	1	2	2	2	-
CO3	2	-	2	-	-	-	-	-	2	-	2	2	1	1	-
CO4	2	2	-	-	-	-	-	-	2	2	2	1	2	1	-
CO5	2	2	2	-	-	-	-	-	2	2	2	2	2	2	-
Average	**2**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**1.8**	**1.2**	**1.8**	**1.6**	**1.8**	**1.4**	**-**

1 - Low, 2 - Medium, 3 - High, '-"- No Correlation