FATIMA COLLEGE (AUTONOMOUS)

Re-Accredited with "A" Grade by NAAC (3rd Cycle)

74th Rank in India Ranking 2020 (NIRF) by MHRD

Maryland, Madurai- 625 018, Tamil Nadu, India

NAME OF THE DEPARTMENT	: PG DEPARTMENT OF COMPUTER APPLICATIONS
NAME OF THE PROGRAMME	: MCA
PROGRAMME CODE	: MCA
ACADEMIC YEAR	: 2020 - 2021

FATIMA COLLEGE (Autonomous), Madurai
Master of computer Applications

The board of studies meet for framing the syllabus for MCA was held on 2/3/2019 at 10.30 a.m in the PG Dept. of computer applications

The members of the board were.

1. Dr. S. KANNAN
Professor, Dept. of computer Applications
School of Information Technology
Madurai Kamaraj University
Madurai

2. Dr. T. KATHIRVALAVAKUMAR
Professor & Head
Research Dept. of computer Science
VHNSN college
Virudhunagar

2/3/19

3. Dr. M. PUSHPARANI
Professor & Head
Dept. of computer Science
Mother Teresa women's University
Research & Extension center
Madurai

2/3/19

4. Mr. G. Sahayaraj
Principal Software Engineer
Dell International Services
Bangalore

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5. Ms. A. DIVYASRI
Project Manager - Android
Bricksteel Enterprises Infotech Pvt. Ltd.
Madurai

6. Mrs. E. Helena
Dean of academic affairs - SF

7. Mrs. B. chandirika

8. Mrs. S. Mary Helan Felista

9. Mrs. R. Smecta Mary

10. Mrs. S. Jeba Priya

11. Mrs. B. Usha

12. Mrs. S. Selvarani

DIRECTOR

Dr. S. Raju

Discussions Made & Resolutions Proposed

1. Consent to change the structure of the curriculum to facilitate the inclusion of specialization was obtained. Internship to be included as a new course as a part of the curriculum 19MCA510

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2. The paper Compiler Design offered as an elective was proposed to be included as a core paper to facilitate NET/SET exams.

3. This paper was decided to be included in the IV Semester.

4. Internet Programming Using J2EE paper has to be replaced with the paper "Machine Learning", as it is the recent trend in the software industry.

5. J2EE lab offered in the V semester has to be replaced with the Lab - "Machine Learning Using Python / R".

6. The following speacialinations were proposed and acknowledged.

* Data Science - courses included were
i) 19MCADS01 - Big Data Analytics ii) Big Data Security iii) 19MCADS03 (19MCADS02)
* Networking i) 19MCA NW03 - High speed N/w.
ii) 19MCA NW01 - Cryptography iii) 19MCANW02 - Wireless Sensor N/w
* Application Development i) 19MCA AD03
ii) 19MCA AD01 - Web. Pgm. Tech iii) 19MCA AD02 - Internet Pgm. frameworks.

7. .NET paper in the V th Semester has to include MVC using ASP. net and C#.

* Skill Based Lab Papers included
i) 19MCA306 - Networking Tools
ii) 19MCA506 - R programming

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8. General electives offered are categorized under two themes.

* E-business process for enhancing the employability & entrepreneurship.

New courses
i) 19MCAGE07 - Entrepreneurship Development

* Research Disciplines for motivating the students towards research.

New courses
i) 19MCAGE21 - Research Methodology ii) 19MCAGE27 - Advanced DBMS Techniques

9. The paper Soft Computing, Digital Image Processing has to be offered under general elective

10. An open online course (MOOC, Swayam, NPTEL,...) was proposed by the department to be included as a part of the curriculum to make it dynamic. The students can opt for any trending course of her interest. This was highly appreciated & acknowledged by the members.

11. A self study paper on IoT was proposed in VI Sem.

12. Board members suggested offering value added courses for advanced learners. They could be facilitated to opt for extra courses from the general electives offered, to earn extra credits.

13. Mobile Application Development lab has to include hybrid development frameworks like ionic / React.

14. Detailed Syllabus, Text books & Reference books for all the courses of all VI semesters were discussed in detail.

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1. Dr. S. Kannan — 2/3/19
2. Dr. T. Kathirvalavakumar — 2/3/19
3. Dr. M. Pushparani — 2/3/19
4. Mr. G. Sahayaraj
5. Ms. A. Divyasri
6. Mrs. E. Helena
7. Mrs. B. Chandirika
8. Mrs. S. Mary Helan Felista
9. Mrs. R. Smeeta Mary
10. Mrs. S. Jebapriya
11. Mrs. B. Usha
12. Mrs. S. Selvarani

DIRECTOR

Dr. S. Raju

02/03/19

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FATIMA COLLEGE (AUTONOMOUS), MADURAI
MASTER OF COMPUTER APPLICATIONS

The Board of studies meet for framing the syllabus for MCA was held on 28/2/2020 at 9.30 a.m in the PG Department of Computer Applications.

The members of the Board were

1. Dr. S. KANNAN
Professor
Department of Computer Applications
School of Information Technology
Madurai Kamaraj University
Madurai

S Kannan 28/2/20

2. Dr. G. CHANDRASEKARAN
Senior Professor & Director
Department of MCA
MEPCO SCHLENK Engineering College
Sivakasi

28/2/2020.

3. Dr. M. PUSHPARANI
Professor & Head
Department of Computer Science
Mother Teresa Women's University
Research & Extension Centre
Madurai

28/2/2020

4. Mr. G. SAHAYARAJ
Principal Software Engineer
Dell International Services
Bangalore

5. MS. R. G. SOBITHA
Operation Manager
Business Development
Bricksteel Enterpoises Infotech Pvt. Ltd.
Madurai

6. MS. A. Mabbe Jasmine Shobha
Dean of Academic Affairs

7. Dr. D. Jeyamala, Director

8. Mrs. S. Mary Helan Felista

9. Mrs. R. Smeeta Mary

10. Mrs. S. Jeba Priya

11. Mrs. B. Usha

12. Mrs. P. Nancy Vincentina Mary

13. MS. K. Laxmisri

Action Taken Report on Board of Studies 2019

Based on the resolutions proposed in the board meeting 2019, the following modifications were made in the syllabus.

ggestion Facilitate to offer specializations in the programme.

1. Specialization electives on the following domains were introduced in the curriculum.
   a) Data Science
   b) Networking
   c) Application Development

gestion Include Compiler Design Course in the core to crack NET/SET

2. A course on "compiler Design" with code 19MCA401 was included in the IV semester

gestion Include the course Machine Learning as it is the recent trend.

3. A course on "Machine Learning Using Python" with code 19MCA502 was offered in the Vth semester.

gestion Use MVC frameworks in the course web application development

4. A course on "Web Application Development" with code 19MCA503 was redesigned to include MVC frameworks.

gestion Include a self study course on Internet of Things

5. A self study course on "Internet of Things" with code 19MCA602 was included in the VI semester

ggestion Open online courses to be facilitated

6. Students are mandated to opt for an open online course (MOOC, NPTEL, Microsoft / Oracle certification etc..) once in a year.

Minutes

After the conduct of the board meet, following were the discussions made & Resolutions Proposed.

1. Action taken report on the previous board was submitted.

2. Credits of either 1 or 2 has to be assigned based on the duration of the MOOC course.

3. Remedial programme document should include the impact factor.

4. Peer group activities in the extension activity should be recorded.

5. Value added courses exclusively for MCA students should be offered and the corresponding impact factor to be recorded.

6. Programme Requisites of the value added courses to be detailed.

7. List of companies for project should be from metropolitan cities.

8. Agile software development should include an overview of tools like HitHab & YML. Roles of agile & scrum to be detailed.

9. Live recording of project presentations to be made.

10. The course "Programming with Java" to include

the RMI component. (19MCA303)

11. The content of the course "Wireless Sensor Networks" and "Cloud computing" were redesigned based on the student feedback. (19MCANW02 & 19MCAGE26)

12. The content of the course "Programming in Python" is changed to facilitate easy learning. (19MCA403)

13. The course "Web Application Development" to be renamed as Enterprise Application Development and it includes frameworks like MVC, Hibernate and DJANGO. (19MCA503)

14. A course for advanced learners is to be introduced in the V th semester. The course to be introduced is "Human Computer Interaction"

15. List of examiners for Lab, Project & comprehensive viva-voce were discussed.

16. MOU's to be proposed were discussed.

1. Dr. S. Kannan — [signature] 28/2/20

2. Dr. G. Chandrasekaran — [signature] 28/2/2020

3. Dr. M. Pushparani — [signature] 28/2/2020

4. Mr. G. Sahayaraj

5. Mrs. R.G. Sobitha

6. Ms. A. Mable Jasmine Shobha

7. Dr. D. Jeya Mala

8. Mrs. S. Mary Helan Felista

9. Mrs. R. Smeeta Mary

10. Mrs. S. Jebapriya

11. Mrs. B. Usha

12. Mrs. P. Nancy Vincentina Mary

13. Ms. K. Laxmisri

FATIMA COLLEGE (AUTONOMOUS), MADURAI
MASTER OF COMPUTER APPLICATIONS

The Board of studies meet for framing the syllabus for MCA was held on 7/8/2020 at 10 a.m in the online mode through Google Meet. The link for the meet is as follows:

meet.google.com/ixk-ktug-pwa

The members of the Board were

1. University Nominee
   Dr. S. KANNAN
   Professor
   Dept. of Computer Applications
   School of Information Technology
   Madurai Kamaraj University
   Madurai

2. Academic Expert
   Dr. G. CHANDRASEKARAN
   Senior Professor & Director
   Department of MCA
   MEPCO Schlenk Engineering College
   Sivakasi

3. Academic Expert
   Dr. M. Pushparani
   Professor & Head
   Department of Computer Science
   Mother Teresa University
   Research & Extn. Center, Madurai

4. Industry Expert
Mr. S. Manikumar
Senior Software Developer
Ericsson, Chennai

5. Alumna
Ms. R. G. Sobitha
Operation Manager
Business Development
Bricksteel Enterprises Infotech Pvt. Ltd.
Madurai

6. Academic Dean
Ms. A. Mable Jasmine Shobha — A. Mable Jasmine Shobha.
Dean of Academic Affairs
Fatima College, Madurai

7. Dr. D. Jeya Mala, Director

8. Mrs. S. Mary Helan Felista

9. Mrs. R. Smeeta Mary

10. Mrs. S. Jeba Priya

11. Mrs. B. Usha

12. Mrs. S. Selvarani

13. Mrs. P. Nancy Vincentina Mary

Action Taken Report on Board of Studies, FEB 2020

Based on the resolutions proposed in the board meeting held on 28/2/2020, the following changes were implemented.

* The content of the following courses were redesigned to facilitate better learning

  → 19MCANW02 - Wireless Sensor Networks
  → 19MCAGE26 - Cloud Computing
  → 19MCA403 - Programming in Python

* **19MCA503**
  The course Web Application Development was reframed as "Enterprise Application Development. It includes framework like MVC, SPRING, STRUTS, HIBERNATE & DJANGO

* **19MCAALO1**
  A course on "Human Computer Interaction" is offered for advanced learners.

MINUTES OF BOARD OF STUDIES MEETING
AUGUST, 2020

AICTE declared MCA as two year programme from the current academic year. The courses for the 2 year MCA programme was presented in the board meeting by the respective course designers. The courses and the suggestions given by the board members are as follows:

SEMESTER I

1. 20MCA101 - Mathematical Foundation of Computer Science
   The course was presented by the faculty and got approved by the membes of the board.

2. 20MCA102 - Software Engineering
   The board membes suggested to include the recent software engineering frameworks in Unit V

3. 20MCA103 - Operating System
   Suggestions to remove security concepts in Unit V and include Advanced Operating System concepts in place of it was made by one of the board membes and others acknowledged it.

4. 20MCA104 - Programming in Python
   A discussion arose on having this course in the first semester and finally the board membes approved.

5. Lab courses that are offered in this semester were presented and approved by the members. They are as follows:

→ 20MCA105 - Lab I - Python Programming
→ 20MCA106 - Lab II - RDBMS
→ 20MCA107 - Skill Based Lab I - Linux

6 Soft skill → 20MCA108 - Soft skills I - Professional Communication

SEMESTER II

1. 20MCA201 - Data structures and Algorithms

A discussion on the various computer algorithms included in the course were discussed and approved by the board members.

2. 20MCA202 - Web Technologies

Industry Expert insisted on implementing real time application development which is actually done in the corresponding course on lab and hence the course got approved.

3. 20MCA203 - Programming in Java

Board members asserted the importance of including the course on Core Java in the programme and appreciated for the same.

4. Lab courses that are offered in this semester were presented and approved by the members. They are as follows:

→ 20MCA204 - Lab III - Web Technologies
→ 20MCA205 - Lab IV - Java Programming
→ 20MCA206 - Skill Based Lab II - R Programming

5. Soft skill → 20MCA207 - Soft Skills II - Aptitude Training

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SEMESTER III

1. 20MCA301 - Internship & Mini Project
   The board members enquired on the duration of the internship. It was clarified that Internship and a corresponding mini project has to be completed in the summer vacation for which the minimal time duration is 1 month.

2. 20MCA302 - Software Quality & Testing
   This new course was presented to the members and was approved by them.

3. 20MCA303 - Mobile Application Development
   Members suggested to curtail the theory concept and include more of application development towards practical implementation of mobile apps.

4. 20MCA304 - Enterprise Application Development
   The course was highly appreciated by the industrial expert and suggestions were given to create real time projects in the corresponding course on lab.

5. Lab courses that are offered in this semester were presented and approved by the members. They are as follows:
   - → 20MCA304 - Lab V - Mobile Application Development
   - → 20MCA305 - Lab VI - Enterprise Application Development
   - → 20MCA306 - Skill Based Lab III - CASE Tools

SEMESTER IV

1. 20MCA401 - UIX Design Programming - Lab VII

This course focus on modern technologies for interactive web application development and one such kind was appreciated and approved by the members.

2. 20MCA402 - Project

Since the students are expected to do one major core and one specialization elective courses in this semester, the tenure of the project was discussed and finalized as 2 months (60 days)

ELECTIVES

→ The Programme offers specialization and General Electives
→ Specialization Electives are offered under the titles
  * Data Analytics
  * Distributed System Security
  * AI & Machine Learning
→ 6 courses on each title is offered under specialization Electives
→ 12 courses are offered under General Electives
→ The members suggested to include appropriate software tools in the Unit V of the elective courses so that practical knowledge of the courses

could be imparted to the students.

GENERAL ELECTIVES

The following courses are offered as General Electives from Semester I till Semester III. Board members approved the courses since these courses were scruitinized and approved in the board meet conducted in February, 2020.

- → 20MCAGE01 Office Automation tools
- → 20MCAGE02 Financial Management & Accounting
- → 20MCAGE03 Organizational Behaviour
- → 20MCAGE04 E- Commerce
- → 20MCAGE05 Ethics in Computing
- → 20MCAGE06 Resource Management Techniques
- → 20MCAGE07 Entrepreneurship Development
- → 20MCAGE08 Wireless Sensor Networks
- → 20MCAGE09 Research Methodology
- → 20MCAGE10 Digital Image Processing
- → 20MCAGE11 Cloud Computing
- → 20MCAGE12 Agile Software Engineering

SPECIALIZATION ELECTIVES

The board members approved the following specialization elective courses offered under three titles.

I DATA ANALYTICS

S.No	Semester	Course Code	Course Title
1.	II	20MCADA01	Data Mining Techniques
2.	II	20MCADA02	Data Analytics & Visualization - Using Spreadsheets
3.	III	20MCADA03	Big Data Analytics
4.	III	20MCADA04	Data Analytic Tools & Techniques
5.	IV	20MCADA05	Business Analytics Using R
6.	IV	20MCADA06	Big Data Security

II DISTRIBUTED SYSTEM SECURITY

S.NO.	Semester	Course Code	Course Title
1.	II	20MCADS01	Data Communication & Networks
2.	II	20MCADS02	Wireless Communication & - Security
3	III	20MCADS03	Cryptography & Network Security
4.	III	20MCADS04	Cyber Forensics
5.	IV	20MCADS05	Cloud Security
6.	IV	20MCADS06	High Speed Networks

III AI & MACHINE LEARNING

S.No.	Semester	Course Code	Course Title
1.	II	20MCAAM01	Artificial Intelligence & - Expert System
2.	II	20MCAAM02	Soft Computing
3.	III	20MCAAM03	Machine Learning
4.	III	20MCAAM04	Neural Networks
5.	IV	20MCAAM05	Human Computer Interaction
6.	IV	20MCAAM06	Deep Learning

ADD ON COURSES

→ Courses on soft skills are offered as add on courses from semester I till semester III
→ MOOC/SWAYAM/NPTEL courses are mandated for every year of study.

COURSE FOR ADVANCED LEARNERS

→ Course on "Internet of Things" is offered as a self study course for advanced learners which would earn them extra credits. This was highly appreciated and approved by the board members.

GENERAL SUGGESTIONS

→ Academic experts insisted on offering a Bridge Course on the basic concepts of computer applications to the I year students whose UG degree is not based on computers

→ Industry Expert & Alumna insisted on the focus of the entire programme towards real time projects & internship.

1. Dr. D. Jeyamala, Director
2. Mrs. S. Mary Helan Felista
3. Mrs. R. Smeeta Mary
4. Mrs. S. Jeba Priya
5. Mrs. B. Usha
6. Mrs. S. Selvarani
7. Mrs P. Nancy Vincentina Mary

Academic Dean
Ms. A. Mable Jasmine Shobha - A. Mable Jasmine Shobha

A. Ly Miss Sahaya Mary

LETTER OF DECLARATION

I, Dr. S.KANNAN, hereby declare that, I had attended the Board of Studies Meeting for the Upgradation of Syllabus on August7th, 2020in the PG Department of Computer Applications, Fatima College(Autonomous), Madurai-18.

Place : Madurai

Date : 7.8.2020

Signature

LETTER OF DECLARATION

I, Dr. G.CHANDRASEKARAN, hereby declare that, I had attended the Board of Studies Meeting for the Upgradation of Syllabus on August 7th, 2020 in the PG Department of Computer Applications, Fatima College(Autonomous), Madurai-18.

Place : Madurai

Date : 7.8.2020

Signature

LETTER OF DECLARATION

I, Dr. M.PUSHPARANI, hereby declare that, I had attended the Board of Studies Meeting for the Upgradation of Syllabus on August 7th, 2020 in the PG Department of Computer Applications, Fatima College(Autonomous), Madurai-18.

Place : Madurai

Date : 7.8.2020

Signature

LETTER OF DECLARATION

I, Mr. S.MANIKUMAR, hereby declare that, I had attended the Board of Studies Meeting for the Upgradation of Syllabus on August 7th, 2020 in the PG Department of Computer Applications, Fatima College(Autonomous), Madurai-18.

Place : Madurai

Date : 7.8.2020

S. Manikumar

Signature

LETTER OF DECLARATION

I, Mrs. G. SOBITHA, hereby declare that, I had attended the Board of Studies Meeting for the Upgradation of Syllabus on August 7th, 2020 in the PG Department of Computer Applications, Fatima College(Autonomous), Madurai-18.

Place : Madurai

Date : 7.8.2020

Signature

FATIMA COLLEGE (AUTONOMOUS), MADURAI

PG DEPARTMENT OF COMPUTER APPLICATIONS

MCA – (2020 – 2021)

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
SEMESTER - I						
20MCA101	Mathematical Foundation of Computer Science	4	4	50	50	100
20MCA102	Software Engineering	4	4	50	50	100
20MCA103	Operating Systems	4	4	50	50	100
20MCA104	Programming in Python	4	4	50	50	100
*	Elective I – General	4	4	50	50	100
20MCA105	Lab I – Python Programming	4	2	50	50	100
20MCA106	Lab II - RDBMS	4	2	50	50	100
20MCA107	Skill Based lab I–Linux	2	1	25	25	50
20MCA108	Soft Skills I – Professional Communication	2	1	25	25	50
SEMESTER - II						
20MCA201	Data Structures and Algorithms	4	4	50	50	100
20MCA202	Web Technologies	4	4	50	50	100
20MCA203	Programming in Java	4	4	50	50	100
*	Elective I – Specialization	4	4	50	50	100
*	Elective II – General	4	4	50	50	100
20MCA204	Lab III – Web Technologies	4	2	50	50	100
20MCA205	Lab IV- Java Programming	4	2	50	50	100

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
20MCA206	Skill Based Lab II - R Programming	2	1	25	25	50
20MCA207	Soft Skills II – Aptitude Training	2	1	25	25	50
SEMESTER - III						
19MCA301	Graph Theory	4	4	50	50	100
19MCA302	Data Communication & Networking	4	4	50	50	100
19MCA303	Programming in Java	4	4	50	50	100
	Elective III – Specialization	4	4	50	50	100
	Elective IV - General	4	4	50	50	100
19MCA304	Lab V - PHP & MYSQL	6	3	50	50	100
19MCA305	Lab VI- Java Programming	6	3	50	50	100
19MCA306	Skill Based Lab III- Networking Tools	2	1	25	25	50
19MCA307	Soft Skills III – Quantitative Aptitude	2	1	25	25	50
SEMESTER - IV						
19MCA401	Compiler Design	4	4	50	50	100
19MCA402	Mobile Communication &Application development	4	4	50	50	100
19MCA403	Programming in Python	4	4	50	50	100
	Elective V – Specialization	4	4	50	50	100
	Elective VI – General	4	4	50	50	100
19MCA404	Lab VII - Mobile Application Development	6	3	50	50	100
19MCA405	Lab VIII- Python Programming	6	3	50	50	100
19MCA406	Skill Based Lab IV - Software Testing Tools	2	1	25	25	50
19MCA407	Soft Skills IV – Technical Aptitude	2	1	25	25	50

COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
SEMESTER - V						
19MCA501	Software Project Management	4	4	50	50	100
19MCA502	Machine Learning	4	4	50	50	100
19MCA503	Enterprise Application Development	4	4	50	50	100
	Elective VII – Specialization	4	4	50	50	100
	Elective VIII - General	4	4	50	50	100
19MCA504	Lab IX - Python for Machine Learning	6	3	50	50	100
19MCA505	Lab X - Enterprise Application Development	6	3	50	50	100
19MCA506	Skill Based Lab V –R Programming	2	1	25	25	50
19MCA507	Soft Skills V – Interpersonal Skills for Corporate Readiness	2	1	25	25	50
SEMESTER - VI						
19MCA601	Major Project		12	100	100	200
19MCA602	Internet of Things – Self Learning Course		5	50	50	100
19MCAAL01	Human Computer Interaction (Self - Learning Extra Credit course For Advanced Learners)		4	50	50	100

ELECTIVES – I MCA

SPECIALIZATION ELECTIVE - DATA ANALYTICS

S.NO	SEMESTER	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	II	20MCADA01	Data Mining Techniques	4	4	50	50	100
2.	II	20MCADA02	Data Analytics and Visualization using Spreadsheets	4	4	50	50	100

SPECIALIZATION ELECTIVE – DISTRUIBUTED SYSTEM SECURITY

S.NO	SEMESTER	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	II	20MCADS01	Data Communication & Networking	4	4	50	50	100
2.	II	20MCADS02	Wireless Communication & Security	4	4	50	50	100

SPECIALIZATION ELECTIVE – AI & MACHINE LEARNING

S.NO	SEMESTER	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	II	20MCAAM01	Artificial Intelligence & Expert System	4	4	50	50	100
2.	II	20MCAAM02	Soft Computing	4	4	50	50	100

GENERAL ELECTIVES

S.NO	COURSE CODE	COURSE TITLE	HRS / WK	CREDIT	CIA Mks	ESE Mks	TOT. MKs
1.	20MCAGE01	Office Automation Tools	4	4	50	50	100
2.	20MCAGE02	Financial Management and Accounting	4	4	50	50	100
3.	20MCAGE03	Organizational Behaviour	4	4	50	50	100
4.	20MCAGE04	E-Commerce	4	4	50	50	100
5.	20MCAGE05	Ethics in Computing	4	4	50	50	100
6.	20MCAGE06	Resource Management Techniques	4	4	50	50	100
7.	20MCAGE07	Entrepreneurship Development	4	4	50	50	100
8.	20MCAGE08	Wireless Sensor Networks	4	4	50	50	100
9.	20MCAGE09	Research Methodology	4	4	50	50	100
10.	20MCAGE10	Digital Image Processing	4	4	50	50	100
11.	20MCAGE11	Cloud Computing	4	4	50	50	100
12.	20MCAGE12	Agile Software Engineering	4	4	50	50	100

ELECTIVES – II & III MCA

SPECIALIZATION ELECTIVE – DATA SCIENCE

S.NO	SEMESTER	SUBJECT CODE	SUBJECT TITLE
1	III	19MCADS01	Big Data Analytics
2	IV	19MCADS02	Big Data Security
3	V	19MCADS03	Data Analytics Using Pig & Hive

SPECIALIZATION ELECTIVE – NETWORKING

S.NO	SEMESTER	SUBJECT CODE	SUBJECT TITLE
1	III	19MCANW01	Cryptography & Network Security
2	IV	19MCANW02	Wireless Sensor Networks
3	V	19MCANW03	High Speed Networks

SPECIALIZATION ELECTIVE – APPLICATION DEVELOPMENT

S.NO	SEMESTER	SUBJECT CODE	SUBJECT TITLE
1	III	19MCAAD01	Web Programming Techniques
2	IV	19MCAAD02	Internet Programming Frameworks
3	V	19MCAAD03	Software Development Frameworks

GENERAL ELECTIVES

S.NO	SUBJECT CODE	SUBJECT TITLE
E-BUSINESS PROCESS		
1	19MCAGE01	Resource Management Techniques
2	19MCAGE02	Financial Management & Accounting
3	19MCAGE03	Management Information Systems
4	19MCAGE04	E-Commerce
5	19MCAGE05	Cyber Forensics
6	19MCAGE06	Ethics in Computing
7	19MCAGE07	Entrepreneurship Development
RESEARCH DOMAIN		
8	19MCAGE21	Research Methodology
9	19MCAGE22	Data Mining & Data warehousing
10	19MCAGE23	Digital Image Processing
11	19MCAGE24	Artificial Intelligence & Expert Systems
12	19MCAGE25	Soft Computing
13	19MCAGE26	Cloud Computing
14	19MCAGE27	Advanced DBMS Techniques

I MCA

SEMESTER – II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCADA01	DATA MINING TECHNIQUES	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides the basic concepts, principles, methods, implementation techniques and applications of data mining.

COURSE OBJECTIVE

- To know then scope and necessity of Data mining for the Society.
- To understand & analyze the various algorithms for Knowledge Extraction.
- To acquire the basic knowledge of various data mining techniques through Weak tool.

UNIT I **(12 Hours)**

INTRODUCTION:

What is Data Mining? , Data Mining: Definitions, KDD vs Data Mining, Stages of KDD, DBMS vs DM, Other Related Areas, DM Techniques, Other Mining Problems, Issues and Challenges in DM.

SELF STUDY: Issues and Challenges in DM

UNIT II **(12 Hours)**

ASSOCIATION RULES:

What is an Association Rule?, Methods to discover Association Rules, A Priori Algorithm, Partition Algorithm, Pincer Search Algorithm, FP-tree Growth Algorithm, Discussion on different algorithms, Generalized Association Rule.

SELF STUDY: Discussion on different algorithms

UNIT III **(12 Hours)**

CLUSTERING TECHNIQUES:

Clustering paradigms, Partitioning Algorithms, k-Medoid Algorithms, CLARA, CLARANS, Hierarchical Clustering, DBSCAN.

SELF STUDY: Hierarchical Clustering

UNIT IV **(12 Hours)**

WEB MINING:

Web Mining, Web Content Mining, Web Structure Mining, Web Usage Mining, Text Mining.

TEMPORAL AND SPATIAL DATA MINING:

What is Temporal Data Mining? , Temporal Association Rules, Sequence Mining, The GSP Algorithm, SPIRIT, Spatial Mining, Spatial Mining Tasks, Spatial Clustering, Spatial Trends.

SELF STUDY: SPIRIT

UNIT V WEKA TOOL **(12 Hours)**

Introduction, Launching Weka Explorer, Preprocessing Data, File conversion, Opening file from a local file system, Opening file from a web site, Reading data from a database, Preprocessing window, Building Classifiers, Clustering data, Finding associations, Attribute selection, Data visualization.

SELF STUDY : Preprocessing window

REFERENCES :

1. Arun K Pujari , “Data mining Techniques”, Universities Press (India) Private Limited, 2008
2. Jiawei Han, Micheline Kamber, Jian Pei, “Data mining Concepts and Techniques”, Third Edition, Morgan Kaufman Publishers, 2012.
3. Bharat Bhushan Agarwal, Sumit Prakash Tayal, “Data Mining and Data Warehousing”, Laxmi Publications Ltd., 2009
4. Margaret H ,”Data Mining: Introductory And Advanced Topics”, Dunham Pearson Education India, 2006.
5. Usama M.Farrad, Geogory Piatetsky – Shapiro, Padhrai Smyth and Ramasamy Uthurusamy, “ Advances in Knowledge Discovery and Data Mining”, The M.I.T. Press 1996.

WEB REFERENCES:

1. https://www.tutorialspoint.com/data_mining
2. http://people.sabanciuniv.edu/berrin/cs512/lectures

I MCA

SEMESTER – II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCADA02	DATA ANALYTICS AND VISUALIZATION USING SPREADSHEETS	SPECIALIZATION ELECTIVE – DATA ANALYTICS	4	4

COURSE DESCRIPTION

This course provides knowledge to perform data analysis using Excel's most popular features.

COURSE OBJECTIVE

- Learn about the pivot tables in Spreadsheet
- Provide knowledge on Data Checking and Evaluation.
- Perform Data Analysis and Evaluation

UNIT I

Introducing Spreadsheet

Building Tables - Analyzing Table Information

Grabbing Data from External Sources

Getting Data the Export - Import Way - Querying External Databases and Web Page Tables

UNIT II

Cleaning Data

Editing Your Imported Workbook - Cleaning Data with Text Functions

Working with PivotTables

Looking at Data from Many Angles - Running the PivotTable Wizard- Customizing How Pivot Tables Work and Look

UNIT III

Building PivotTable Formulas

Adding Another Standard Calculation - Creating Custom Calculations - Using Calculated Fields and Items - Retrieving Data from a Pivot Table

Working with PivotCharts

Running the PivotTable Wizard - Fooling Around with Your Pivot Chart.

Customizing PivotCharts

Selecting a Chart Type - Working with Chart Styles - Changing Chart Layout - Changing a Chart's Location - Formatting the Plot Area - Formatting the Chart Area

UNIT IV

Using the Database Functions

Using the DAVERAGE Function -Using the DCOUNT and DCOUNTA Functions- Using the DGET Function - Using the DMAX and DMAX Functions - Using the DPRODUCT Function - Using the DSTDEV and DSTDEVP Functions - Using the DSUM Function - Using the DVAR and DVARP Functions

Using the Statistics Functions

Counting Items in a Data Set - Means, Modes, and Medians - Finding Values, Ranks, and Percentiles - Standard Deviations and Variances - Regression Analysis - Correlation

UNIT V

Descriptive Statistics

Using the Descriptive Statistics Tool - Creating a Histogram - Ranking by Percentile - Calculating Moving Averages Exponential Smoothing - Generating Random Numbers - Sampling Data

Inferential Statistics

Using the t-test Data Analysis Tool - Performing z-test Calculations - Creating a Scatter Plot - Using the Regression Data Analysis Tool - Using the Correlation Analysis Tool - Using the Covariance Analysis Tool - Using the ANOVA Data Analysis Tools - Creating an f-test Analysis - Using Fourier Analysis

REFERENCES:

1. Stephen L. Nelson, and E. C. Nelson, "Excel Data Analysis For Dummies" , Second edition, John Wiley & Sons, Inc., 2014
2. Walkenbach, John, "Excel 2016 Bible", John Wiley & Sons, Inc., 2015
3. Jelen, Bill, "Excel 2016 Pivot Table Data Crunching", Pearson Education, Inc, 2016

WEB REFERENCES:

1. owardsdatascience.com/data-analysis-using-excel-885f337c85c
2. https://people.umass.edu/evagold/excel.html
3. https://www.analyticsvidhya.com/blog/2020/04/excel-tips-tricks-data-analysis/

I MCA

SEMESTER – II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCADS02	WIRELESS COMMUNICATION & SECURITY	SPECIALIZATION ELECTIVE – DISTRIBUTED SYSTEM SECURITY	4	4

COURSE DESCRIPTION

This course provides knowledge on key mobile system and wireless communication. It also aims at developing applications using Android

COURSE OBJECTIVE

- To learn the basic concepts of MAC, SDMA, TDMA, FDMA, CDMA.
- To have an exposure about GSM and Satellites.
- To be familiar with wireless protocols, WLAN, Bluetooth.
- To be acquainted with the Mobile Internet Protocol.
- To understand the basic concepts of SIP.

UNIT – I INTRODUCTION (12 Hours)

Applications - History of wireless communication - Simplified reference model- Medium Access Control - Motivation for a specified MAC- SDMA- FDMA- TDMA- CDMA – Comparison of SDMA, TDMA, FDMA, CDMA.

SELF STUDY: History of wireless communication

UNIT – II Mobile Networks (12 Hours)

GSM - Mobile services- System Architecture- Protocols- Handover – Security - New data services – DECT – TETRA – Satellite systems – Introduction – Applications - Basics- Routing- Localization- Handover.

SELF STUDY: Satellite systems Basics

UNIT – III Wireless Systems (12 Hours)

Infra Red Vs Radio transmission- Infrastructure and Adhoc Networks- IEEE 802.11 System Architecture - Protocol Architecture – Newer developments - Bluetooth- Architecture- Link manager Protocol – Security – SDP – IEEE 802.15.

SELF STUDY: Bluetooth

UNIT – IV Mobile IP (12 Hours)

Basics – IP Packet delivery – Tunneling and encapsulation – IP micro mobility support – Dynamic host configuration protocol – Mobile ad-hoc networks – Overview ad-hoc routing protocols.

UNIT – SIP (12 Hours)

Introduction - VoIP Technology – SIP Overview – Network Elements – SIP System Architecture – SIP Basic call flow - SIP trapezoid – SIP Messaging – SIP Response Codes – SIP Headers.

SELF STUDY: SIP Headers

REFERENCES:

1 Jochen Schiller, “Mobile communication”, Second Edition, Pearson Education,12th Impression, 2013.

2. Wei- Manglee, “Beginning Android 4 Application Development”, Wiley India pvt ltd, Reprint 2013

3. Reto Meier, “Professional Android4 Application Development”, Wiley India Edition.

4. Wallace B. Maclure, Nathan Blevins, John J Croft IV, Jonathan Dick, Chris Hardly,"Professional Android Programming", Wiley India Edition

WEB REFERENCES:

1. https://www.tutorialspoint.com/session_initiation_protocol/session_initiation_protocol_introduction.htm
2. https://nsrc.org/wrc/data/2004/629197984427ef56fc2cd1/sanog4-aarati-voiptut.pdf
3. http://www.cse.psu.edu/~pdm12/cse545-s11/slides/cse545-voip.pdf

GENERAL ELECTIVE - MCA

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE01	OFFICE AUTOMATION TOOLS	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course enable the students in crafting professional word documents, excel spread sheets, power point presentations using the Microsoft suite of office tools and also preparation of documents and presentations with office automation tools.

COURSE OBJECTIVE

- Learn the various types of documentation using Word Processing S/w.
- Understand the design and create excellent programming types of process using function and having huge statistical report with charts and other process.
- Develop presentational Skills by Power Point and it's process to perform documentation

UNIT – I WORKING WITH DOCUMENTS (12 Hours)

Introduction: Opening & Saving files, Editing text documents, Inserting, Deleting, Cut, Copy, Paste, Undo, Redo, Find, Search, Replace, Formatting page & setting Margins, Converting files to different formats, Importing & Exporting documents, Sending files to others, Using Tool bars, Ruler, Using Icons, using help.

Formatting Documents: Setting Font styles, Font selection- style, size, colour etc,

Type face: Bold, Italic, Underline, Case settings, Highlighting, Special symbols, Setting Paragraph style, Alignments, Indents, Line Space, Margins, Bullets & Numbering.

Setting Page style: Formatting Page, Page tab, Margins, Layout settings, Paper tray, Border & Shading, Columns, Header & footer, Setting Footnotes & end notes, Shortcut

Keys, Inserting manual page break, Column break and line break, Creating sections & frames, Anchoring & Wrapping, Setting Document styles, Table of Contents, Index, Page Numbering, date & Time, Author etc., Creating Master Documents, Web page.

Creating Tables: Table settings, Borders, Alignments, Insertion, deletion, Merging, Splitting, Sorting, and Formula,

Drawing: Inserting ClipArts, Pictures/Files etc.,

Tools: Word Completion, Spell Checks, Mail merge, Templates, Creating contents for books, Creating Letter/Faxes, Creating Web pages, Using Wizards, Tracking Changes, Security, Digital Signature, Printing Documents, Shortcut keys.

UNIT – II SPREADSHEET (12 Hours)

Introduction: Spread Sheet & its Applications, Opening Spreadsheet

Menus: main menu, Formula Editing, Formatting, Toolbars, Using Icons, Using help, Shortcuts, Spreadsheet types.

Working with Spreadsheets: opening, Saving files, setting Margins, Converting files to different formats, importing, exporting, sending files to others.

Spread sheet addressing: Rows, Columns & Cells, Referring Cells & Selecting Cells – Shortcut Keys.

Entering & Deleting Data: Entering data, Cut, Copy, Paste, Undo, Redo, Filling Continuous rows, columns, Highlighting values, Find, Search & replace, Inserting Data, Insert Cells, Column, rows & sheets, Symbols, Data from external files, Frames, Clipart, Pictures, Files etc, Inserting Functions, Manual breaks.

UNIT – III Advanced SPREADSHEET (12 Hours)

Setting Formula: finding total in a column or row, Mathematical operations, Using other Formulae.

Formatting Spreadsheets: Labelling columns & rows, Formatting- Cell, row, column & Sheet

Category – Alignment: Font, Border & Shading, Hiding/ Locking Cells, Anchoring objects, Formatting layout for Graphics, Clipart etc., Worksheet Row & Column Headers, Sheet Name, Row height & Column width,

Visibility: Row, Column, Sheet, Security, Sheet Formatting & style, Sheet background, Colour etc, Borders & Shading – Shortcut keys.

Calculations: Sorting, Filtering, Validation, Consolidation, and Subtotal, Creating Charts - Drawing. Printing,Error checking, Spell Checks, Formula Auditing, Creating & Using Templates, Pivot Tables, Tracking Changes, Security, Customization.

UNIT – IV DATABASE AND REPORTS (12 Hours)

Introduction: Planning a Database, Starting Access, Access Screen

Database: Creating a New Database, Creating Tables, Working with Forms, Creating queries, Finding Information in Databases

Reports: Creating Reports, Types of Reports, Printing & Print Preview, Importing data from other databases.

UNIT – V PRESENTATION (12 Hours)

Introduction: Opening new presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts, Creating a presentation, Setting Presentation style, Adding text to the Presentation.

Formatting a Presentation: Adding style, Colour, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout.

Adding Graphics: Inserting pictures, movies, tables etc into presentation, Drawing Pictures using Draw.

Adding Effects: Setting Animation & transition effects, Printing Handouts, Generating Standalone Presentation viewer.

REFERENCES:

1. Vikas Gupta, “Comdex Information Technology course tool kit”, WILEY Dreamtech, 2008
2. Schmidt Cheryl A, “The Complete Computer upgrade and repair book”,3rd edition, WILEY Dreamtech
3. Archana Kumar, “Computer Basics with Office Automation”, I.K. International Publishing House Pvt. Limited, 2010.
4. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

WEB REFERENCES:

1. https://khpditweebly.weebly.com/office-automation
2. https://books.google.co.in/books?id=iLRHDwAAQBAJ&printsec=frontcover&dq=Introduction+to+Information+Technology

GENERAL ELECTIVE - MCA

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCAGE03	ORGANIZATIONAL BEHAVIOUR	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides solution to learn challenges and opportunities in organizations from a behavioural perspective.

COURSE OBJECTIVE

- To develop an Organisational Behaviour model for any type of Organization.
- To develop and improve the quality of Leadership.
- To evaluate the Common biases and eradication in Decision Making Process.
- To understand how to manage the Stress during a job.

UNIT I INTRODUCTION (12 Hours)

Introduction to Organizational Behaviour(OB), Contributing disciplines to OB Field, challenges and opportunities for OB, Developing an OB Model, Foundation of Individual Behaviour, Ability - Learning. Values, Attitudes and Types of Attitudes. Job satisfaction- Measuring Job satisfaction, Effect of Job satisfaction on employee performance.

SELF STUDY: Values, Attitudes

UNIT II PERSONALITY AND VALUES (12 Hours)

Personality determinants, Achieving personality fit, Factors Influencing perception, Attribution Theory, Perception / Individual Decision Making: Ethics in Decision

Making. Motivation, Management by Objectives, Employee Recognition programs, Employee Involvement programs, Variable Pay Programs.

SELF STUDY: Ethics in Decision Making

UNIT III UNDERSTANDING WORK TEAMS (12 Hours)

Teams Vs Groups – Types of Teams, Creating Effective Teams – Turning Individuals into Team Players. **Communication:** Functions of Communication, Communication Process – Direction of communication, Interpersonal and Organizational communication, Barriers of effective communication, Current issues in Communication.

SELF STUDY: Communication Process

UNIT IV LEADERSHIP & ORGANIZATIONAL STRUCTURE (12 Hours)

Leadership – Meaning, Trait Theories – Behavioural Theories, Contingency Theories, Contemporary issues in Leadership, The foundation of leadership. Inspirational approach – Emotional intelligence. Foundations of Organization structure, Meaning of Organizational structure – Common organizational Designs, New Design Options – Organizational Designs and Employee Behaviour

SELF STUDY: Contemporary issues in Leadership

UNIT V ORGANIZATIONAL CULTURE, CHANGE & STRESS MANAGEMENT (12 Hours)

Organizational culture: Meaning – Creating and sustaining culture, How employees learn culture, creating an ethical organizational culture, creating a customer responsive culture, spirituality and organizational culture. Organizational change and Stress Management: Approaches to Managing organizational change, Creating a Culture, Change in Business, Work stress and its Management.

SELF STUDY: Work stress

REFERENCES :

1. Stephen P. Robbins, "Organisational Behaviour", 11th Edition, Pearson Education, 2009.
2. Uma Sekaran," Organisational Behaviour", 2nd Edition, Tata McGraw-Hill Publishing Company Ltd., New Delhi, 2010.
3. 2. Sharma, R.A," Organisational Theory and Behaviour", 2nd Edition, Tata McGraw-Hill Ltd.,New Delhi, 2007.

WEB REFERENCES:

1. https://www.tutorialspoint.com/organizational_behavior/index.htm
2. https://www.geektonight.com/organizational-behavior-tutorial/

GENERAL ELECTIVE - MCA

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCAGE12	AGILE SOFTWARE ENGINEERING	GENERAL ELECTIVE	4	4

COURSE DESCRIPTION

This course provides an immersive experience in the technical, cultural and social aspects of Agile and DevOps.

COURSE OBJECTIVE

- To learn the software development process using agile.
- To comprehend the quality and risk management in software development.
- To understand the integration between development and operations in software project development.

UNIT I **(12 Hours)**

MODERNIZING PROJECT MANAGEMENT

Project management needed a makeover – Introducing Agile Project Management.

APPLYING AGILE MANIFESTOS & PRINCIPLES

Understanding the Agile Manifesto - Outlining the four values of Agile manifesto- Defining the 12 Agile principles - Agile Benefits.

AGILE APPROACHES:

Overview of lean- Overview of scrum - Overview of Extreme programming.

SELF STUDY : Agile Benefits

UNIT II **(12 Hours)**

AGILE PLANNING AND EXECUTION:

Agile planning – Defining the product vision – Creating a product road map – completing the product backlog.

PLANNING RELEASES AND SPRINTS:

Refining requirements and estimates – Release planning – Sprint planning.

SHOWCASING WORK, INSPECTING AND ADAPTING:

The Sprint review – The sprint retrospective – Preparing for release.

SELF STUDY: Sprint planning

UNIT III **(12 Hours)**

MANAGING SCOPE AND PROCUREMENT

Managing Agile scope - Managing Agile procurement

MANAGING TIME AND COST

Managing Agile schedule – Managing Agile budgets

MANAGING AGILE TEAM DYNAMICS& COMMUNICATION

Managing Agile Team Dynamics **-** Managing Agile communication – Managing Agile quality – Managing Agile risk.

SELF STUDY: Managing Agile communication

UNIT IV FUNDAMENTALS OF DEVOPS **(12 Hours)**

The Definition of DevOps – What DevOps is not - Introduction – Traditional Project Setting – Agile Project Setting – Blame Game: Dev vs. Ops – Operations as Bottleneck - DevOps to Rescue – The Essence of DevOps **SELF STUDY:** Quality and testing

UNIT V **(12 Hours)**

BUILDING BLOCKS OF DEVOPS

Measurement and Metrics – Improving flow of features – Improve And Accelerate Delivery

QUALITY AND TESTING

What is Quality – Pattern for Improving Quality.

SELF STUDY: Specification by example

REFERENCES :

1. Mark C.Layton , Steven J.Ostermiller , “Agile Project Management”, Wiley Publication II edition ,2018
2. MachaelHuttermann, “DevOps for developers”, Apress publication, 2012
3. Joseph joyner, “DevOps for Beginners” Speedy publishing LLC 2015

4. Robert Martin, “Agile software development, Principles patterns and practices” person new international edition, 2013
5. Greene Jennifer, “Learning Agile” Orielly series I edition 2014

WEB REFERENCES:

1. https://martinfowler.com/agile.html
2. https://refactoring.com/

I MCA

SEMESTER – I

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	20MCA108	SOFT SKILLS I – PROFESSIONAL COMMUNICATION	SOFTSKILLS	2	1

COURSE DESCRIPTION

This course provides skills of oral and written communication to work in different environments, develop emotional sensitivity and an awareness of how to work and negotiate with people.

COURSE OBJECTIVE:

- To communicate ethically and efficiently.

TOPICS

1. Elements of Communication
    a. The importance of communication through English
    b. Factors that influence communication
    c. Verbal and Non Verbal Communication
    d. Business Communication
2. Review of English Grammar.
3. Pronunciation Practice.
4. The Sounds of English.
5. Reading and Writing Skills.

I MCA

SEMESTER – II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCA202	WEB TECHNOLOGIES	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides the student with foundational programming knowledge and skills for application development on the Internet.

COURSE OBJECTIVES

- To make the students familiar with client server architecture and able to develop web applications using PHP.
- To plan, design, construct, and integrate basic server-side components of modern web applications including databases and scripts.
- To impart the skills and project-based experience needed for entry into web application and development careers.

UNIT – I HTML5 & CSS 3 **(12Hours)**

The Basics of HTML5 – Document structure – Basic elements – Marking text – Working with characters – Making a list – Table

The Basics of CSS3 – Understanding styles – Styling text – Box model – Styling tables- Positioning elements

HTML 5 Forms - Using input fields – Adding a Text area – Using Drop-Down Lists – Data Validation

Advance CSS3 – Rounding corners – Colors - Creating fonts – Handling media queries

HTML5 and Multimedia – Working with images – Playing Audio – Watching videos

SELF-STUDY: Positioning elements

UNIT- II JAVASCRIPT & JQUERY (12Hours)

Introducing JavaScript – The basics of JavaScript – Controlling program flow – Working with functions

Advanced JavaScript Coding – Document Object Model – Finding your Elements - Document Object Model form data

Using jQuery – Loading the jQuery library –Functions –Finding elements – Replacing data – Changing styles – Changing the Document Object Model

Reacting to events with JavaScript and jQuery – Understanding events – Focusing on JavaScript and events - Looking jQuery and events

SELF STUDY: Understanding events

UNIT – III INTRODUCING PHP (12Hours)

Understanding PHP Basics – Benefits – Variable – Operators - Including files

PHP Flow Control – Looping - Building own functions – event driven PHP

PHP Libraries – Text Functions – Math Functions – Date and time functions

Sessions and carts – Storing Persistent Data – PHP and cookies – PHP and Sessions

SELF STUDY: Math Functions.

UNIT – IV INTRODUCING MYSQL (12Hours)

Introducing MYSQL – Designing and building a database – Managing data – Creating databases – Building tables

Using the database – Working with data – Searching for data

Communicating with the database from PHP Scripts – Database support in PHP – Using mysqli library

SELF STUDY: Searching for data.

UNIT - V AJAX & PHP FRAMEWORK (12 Hours)

Using Ajax – Communicating using JavaScript – Using the jQuery library – Transferring data in AJAX

Getting Acquainted with MVC – Comparing MVC to other web models – Implementing MVC

Selecting a Framework – PHP Frameworks – Popular PHP Frameworks - Looking at Micro Frameworks.

SELF STUDY: Transferring data in AJAX

REFERENCES:

1. Richard Blum, "PHP, MySQL & JavaScript All-in-One For Dummies", John Wiley & Sons, Inc, 2018
2. Robin Nixon, "PHP, MYSQL, JavaScript & CSS", 2nd Edition, O'Reilly, 2012.
3. Chris Minnick, Ed Tittel, "Beginning HTML5 and CSS3 For Dummies",1st edition, 2013
4. Chris Minnick, Eva Holland, "Coding with JavaScript For Dummies", Wiley,2015

WEB REFERENCES:

1. https://www.w3schools.com/html/html5_intro.asp
2. css3generator.com
3. https://www.w3schools.com/php/default.asp
   https://en.wikiversity.org/wiki/Computer_architecture_and_organization

I MCA

SEMESTER - II

(For those who join in 2020 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	20MCA207	SOFT SKILL II – APTITUDE TRAINING	SOFT SKILL	2	1

COURSE DESCRIPTION

This course provides gamut of skills which facilitate the students to enhance their employability quotient and to establish a stronger connect with the technical environment in which they operate. It makes them think critically and apply basic mathematics skills to interpret data, draw conclusions and solve problems.

COURSE OBJECTIVE

- To improve aptitude, problem solving skills and reasoning ability.
- To comprehend the basic concepts of various domains of computer science.

SECTION 1 – ARITHMETIC ABILITY

1. Problems on Numbers
2. Problems on Ages
3. Time and Work
4. Time and Distance
5. Simple Interest
6. Permutation and Combination
7. Odd Man Out & Series

SECTION 2- REASONING

1. Logical Sequence of words
2. Blood Relations Test
3. Series Completion
4. Mirror Images.

SECTION 3 – APTITUDE QUESTIONS

1. Computer Networks
2. RDBMS
3. Operating Systems
4. C/ C++
5. Java
6. Oracle

III MCA

SEMESTER – V

(For those who join in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	19MCA502	MACHINE LEARNING	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides an introduction to learn Machine Intelligence and Machine Learning Applications algorithms to solve real world problems.

COURSE OBJECTIVE

- To introduce the fundamentals of Machine Learning and algorithms.
- To define the classifiers and its associated algorithms
- To impart the knowledge on supervised and unsupervised learning algorithms used for classification, prediction and clustering.

UNIT - I INTRODUCTION (12 Hours)

Introduction to machine learning -Learning Problems – Learning System – Issues in machine learning - Concept Learning - Learning Task – General-to-specific Ordering – Specific Hypothesis – Candidate Elimination – Inductive Bias.

SELF STUDY: Choosing the Target Function

UNIT – II DECISION TREE & BAYESIAN LEARNING (12 Hours)

Decision Tree Learning -Decision tree representation – Issues in decision tree learning- Bayesian Learning - Bayes Theorem – Bayes Theorem and Concept Learning – Naive Bayes classifier - Bayesian Networks -EM Algorithm

SELF STUDY: Avoiding Overfitting the Data

UNIT - III GENETIC ALGORITHMS (12 Hours)

Introduction to Instance Based Learning – K-Nearest Neighbor Learning - Radial Basis Function, Case based reasoning - Genetic Algorithms - Hypotheses – Genetic Operators – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning.

SELF STUDY: Parallelizing Genetic Algorithms

UNIT - IV LEARNING SETS OF RULES (12 Hours)

Introduction to Learning Sets of Rules -Sequential Covering Algorithms – Learning First order Rules – FOIL – Inverting Resolution - Analytical Learning **-** PROLOG EBG – Explanation Based learning – Features.

SELF STUDY: Deductive Learning

UNIT - V ANALYTICAL& REINFORCEMENT LEARNING (12 Hours)

Combining Inductive and Analytical Learning - Approaches – KBANN Algorithm – TANGENTPROP – EBNN – FOCL - Reinforcement Learning - Learning Task – Q Learning – Non deterministic Actions – Temporal Difference Learning – Relationship to Dynamic Programming.

SELF STUDY: Experimentation Strategies

REFERENCES :

1. Tom M. Mitchell , “Machine Learning”, Tata McGraw-Hill, New Delhi
2. Hastie.T, Tibshirani.R, and Friedman.J, “The Elements of Statistical Learning: Data Mining Inference and Prediction”, Second edition, Springer, 2009
3. Christopher M. Bishop , ”Pattern Recognition and Machine Learning – Information Scienceand Statistics”, Springer, 2007

WEB REFERENCES :

1. https://machinelearningmastery.com/machine-learning-with-python/
2. http://ibpsa.fr/jdownloads/Simurex/2015/Presentations/30_03_atelierdatamining.pdf

III MCA

SEMESTER – V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	19MCA503	ENTERPRISE APPLICATION DEVELOPMENT	MAJOR CORE	4	4

COURSE DESCRIPTION

This course provides exposure to different frameworks namely, Struts, Hibernate, Spring and Django. This collective information supports the learner for developing advanced enterprise applications.

COURSE OBJECTIVES

- To know the architectures of Distributed systems, to understand and compare the technologies associated with J2EE and DOTNET.
- To build lightweight enterprise-ready applications
- To acquire capability in Python programming and grow true web applications utilizing Django.

UNIT – I CLIENT SERVER ARCHITECTURE (12 Hours)

2-tier model - 3-tier model - n-tier model -J2EE architecture - DOTNET architecture - MVC architecture.

MVC Architecture - How to start an ASP.NET MVC application - The folders and files for a new MVC application

SELF STUDY : Working with Views - Working with controls

UNIT – II SPRING (12 Hours)

Web services – Consuming a restful web service – Java desktop application / JSP, building REST service with spring – Spring security architecture – accessing relational data using JDBC with spring – Handling form submission – Creation of batch service – Securing web applications –Accessing data with mongo DB – Creating asynchronous method -Using web socket to build an interactive web application.

SELF STUDY : Uploading files – Validating form input

UNIT –III STRUTS (12 Hours)

Struts – Introduction – MVC framework – STRUTS architecture – Business service – Parameter passing – Action class and configuration files – struts.xml tags –Namespace and wild cards – Validation – Interceptors – In built interceptors – Custom interceptors

SELF STUDY : Model driven action – Value stack and OGNL

UNIT – IV HIBERNATE (12 Hours)

HIBERNATE ORM – Persistence – Relational Database – The object relational impedance mismatch – Using native Hibernated APTs and hbm.xml – Using the java persistence API's – Hibernate Validator – HIBERNATE OGM – Configuration of tools – HIBERNATE SEARCH – Enabling full text search capabilities in entities – Introduction to Full Text Search.

SELF STUDY : Indexing – Searching

UNIT – V DJANGO (12 Hours)

Introduction - Django model layer – View layer - Template layer – Forms – Automated admin interface – Django security – Django web application tools – Core functionalities – Geographic Framework.

SELF STUDY : Internationalization and localization

REFERENCES:

1. Justin Couch, Daniel H.Steinberg, "J2EE Bible", Wiley India(P) Ltd, NewDelhi , 2002

2. William S. Vincent, "Django for Beginners: Build websites with Python and Django", 2018

3. Christian Bauer, Gavin King, and Gary Gregory, “Java Persistence with Hibernate”, Second Edition, Manning Publications Co, 2019

4. Craig Walls, “Spring in Action”, Fifth Edition, Manning Publications,2018

5.Sharanam Shah, Vaishali Shah, “Struts 2 for Beginners Struts 2 for Beginners”, 3rd Edition, Arizona Business Alliance,2014

WEB REFERENCES:

1. https://www.javatpoint.com/spring-tutorial
2. https://www.tutorialspoint.com/asp.net_mvc/index.htm
3. https://www.journaldev.com/2134/struts-tutorial-for-beginners#struts-tutorial-8211-result-pages
4. https://howtodoinjava.com/hibernate-tutorials/
5. https://www.guru99.com/django-tutorial.html

III MCA

SEMESTER – V

(For those who join in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	19MCADS03	DATA ANALYTICS USING PIG AND HIVE	SPECIALIZATION ELECTIVE- DATA SCIENCE	4	4

COURSE DESCRIPTION

This course provides knowledge on creating applications to analyze big data.

COURSE OBJECTIVE

- Learn about the fundamental concepts of Pig and Hive.
- Provide knowledge on writing scripts through Pig Latin and understanding Hive data model.
- Perform data definition and data manipulation operations using HiveQL and apply these to perform analytics

UNIT - I **(12 Hours)**

DATA ANALYTICS USING PIG

Introduction – Downloading and installing pig – Running Pig - Grunt – Pig's Data model – Types – Schemas.

SELF STUDY: Types

UNIT - II **(12 Hours)**

INTRODUCTION TO PIG LATIN

Preliminary matters - Input and Output – Relational operations – User defined functions-Advanced relational Operations -Integrating Pig with legacy code and map reduce – Controlling execution**.**

SELF STUDY: Relational operations

UNIT - III **(12 Hours)**

DEVELOPING AND TESTING PIG LATIN SCRIPTS

Writing Evaluation and filter functions – Writing load and store functions –

HIVE - INTRODUCTION

Developing Hive – Services in Hive – Understanding Hive Data model.

UNIT - IV **(12 Hours)**

HIVEQL: DATA DEFINITION

Databases – Alter database – Create Tables – Alter Tables – Manage Tables – Drop Tables.

HIVEQL: DATA MANIPULATION

Load Data into managed tables – Insert into tables from Queries - Creating Tables and Loading Them in One Query - Exporting Data.

SELF STUDY: Insert into tables from Queries

UNIT - V **(12 Hours)**

HIVEQL QUERIES

SELECT … FROM Clauses –Where Clauses – Group by clauses - Join Statements – ORDER BY and SORT BY- DISTRIBUTE BY with SORT BY- CLUSTER BY – casting - Queries that Sample Data – UNION ALL

HIVEQL VIEWS

HiveQL: Indexes - Schema Design – Tuning – Functions – Streaming - Customizing Hive File and Record formats – Security – Locking

SELF STUDY:ORDER BY and SORT BY

REFERENCES:

1. Alan Gates ,“Programming Pig”, First edition, O’Reilly Media, 2011

2. Hanish Bansal, Saurabh Chauhan ,“Apache Hive Cookbook”, Packt publishing, 2016

3.Jason Rutherglen, Dean Wampler, Edward Capriolo , “Programming Hive”, First edition, O’Reilly Media , 2012

4. “Alan Gates & Daniel Dai ,Pig :Data flow Scripting with Hadoop”, O’Reilly Media, 2016
5. BalaswamyVaddeman , “Beginning Apache Pig” , Apress Publications, 2016
6. Dayong Du, “Apache Hive Essentials”, Packet Publishing, 2015

WEB REFERENCES:

1. **https://cognitiveclass.ai/courses/introduction-to-pig/**
2. **https://data-flair.training/blogs/apache-hive-tutorial/**

III MCA

SEMESTER – V

(For those who join in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	19MCAAD03	SOFTWARE DEVELOPMENT FRAMEWORKS	SPECIALIZATION ELECTIVE – APPLICATION DEVELOPMENT	4	4

COURSE DESCRIPTION

This course provides an immersive experience in the technical, cultural and social aspects of Agile and DevOps.

COURSE OBJECTIVE

- To learn the software development process using agile.
- To comprehend the quality and risk management in software development.
- To understand the integration between development and operations in software project development.

UNIT I **(12 Hours)**

MODERNIZING PROJECT MANAGEMENT

Project management needed a make over – Introducing Agile Project Management.

APPLYING AGILE MANIFESTOS & PRINCIPLES

Understanding the Agile Manifesto - Outlining the four values of Agile manifesto- Defining the 12 Agile principles - Agile Benefits.

AGILE APPROACHES:

Overview of lean- Overview of scrum - Overview of Extreme programming.

SELF STUDY : Agile Benefits

UNIT II **(12 Hours)**

AGILE PLANNING AND EXECUTION:

Agile planning – Defining the product vision – Creating a product road map – completing the product backlog.

PLANNING RELEASES AND SPRINTS:

Refining requirements and estimates – Release planning – Sprint planning.

SHOWCASING WORK, INSPECTING AND ADAPTING:

The Sprint review – The sprint retrospective – Preparing for release.

SELF STUDY: Sprint planning

UNIT III **(12 Hours)**

MANAGING SCOPE AND PROCUREMENT

Managing Agile scope - Managing Agile procurement

MANAGING TIME AND COST

Managing Agile schedule – Managing Agile budgets

MANAGING AGILE TEAM DYNAMICS& COMMUNICATION

Managing Agile Team Dynamics **-** Managing Agile communication – Managing Agile quality – Managing Agile risk.

SELF STUDY: Managing Agile communication

UNIT IV FUNDAMENTALS OF DEVOPS **(12 Hours)**

The Definition of DevOps – What DevOps is not - Introduction – Traditional Project Setting – Agile Project Setting – Blame Game: Dev vs. Ops – Operations as Bottleneck - DevOps to Rescue – The Essence of DevOps

SELF STUDY Agile Project Setting

UNIT V **(12 Hours)**

BUILDING BLOCKS OF DEVOPS

Measurement and Metrics – Improving flow of features – Improve And Accelerate Delivery

QUALITY AND TESTING

What is Quality – Pattern for Improving Quality.

SELF STUDY: Improving flow of features

REFERENCES :

1. Mark C.Layton , Steven J.Ostermiller , “Agile Project Management”, Wiley Publication II edition ,2018
2. MachaelHuttermann, “DevOps for developers”, Apress publication, 2012
3. Joseph joyner, “DevOps for Beginners” Speedy publishing LLC 2015
4. Robert Martin, “Agile software development, Principles patterns and practices” person new international edition, 2013
5. Greene Jennifer, “Learning Agile” Orielly series I edition 2014

WEB REFERENCES:

1. https://martinfowler.com/agile.html
2. https://refactoring.com/

III MCA

SEMESTER – V

(For those who join in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	19MCA504	LAB IX- PYTHON FOR MACHINE LEARNING	MAJOR LAB	6	3

COURSE DESCRIPTION

This course provides experiential learning and implementation of machine learning concepts using python

COURSE OBJECTIVE

- To Acquire knowledge and Skills for creation of Web applications.
- To implement Regression and Classification using Python

LAB LIST

1. Exercise to develop simple web applications in Python
2. Exercise to manipulate data using different queries
3. Exercises to handle Exceptions, Multithreading
4. Exercise to extract features from datasets
5. Exercise to implement Regression
6. Exercise to implement Classification
7. Exercise to implement Clustering
8. Exercises for Model selection and evaluation
9. Exercises to Build a data pipeline.

III MCA

SEMESTER – V

For those who joined in 2019 onwards

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/ WEEK	CREDITS
MCA	19MCA505	LAB X – ENTERPRISE APPLICATION DEVELOPMENT	MAJOR LAB	6	3

COURSE DESCRIPTION

This lab course provides the experience in creating, debugging, testing & deploying dynamic web applications. It also gives thorough coverage of the use of MVC for creating web applications.

COURSE OBJECTIVE

- To design applications using J2EE, Struts and Hibernate.
- To develop a web application with n-tier architecture.
- To develop a simple application using Spring MVC.

LAB LIST

1. Create a program to connect with database and manipulate the records in the database using ADO.NET
2. Develop a car showroom inventory web application with 2-tier architecture
3. Develop a real estate web application with n-tier architecture
4. Develop a simple Spring MVC application that take user input and checks the input using standard validation annotations
5. Design a student identity management web application using struts framework. The application should be able to provide an identity such as

student id, access to department assets with department id, access to lab assets with lab id.

6. Create a simple online bookstore using Django as a back end.
7. Creating a Java Application using Hibernate technology.
8. Example for Basic Hibernate CRUD operations.
9. Example for Spring Dependency Injection and Types
10. Example for Simple spring JDBC program

III MCA

SEMESTER – V

(For those who join in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	19MCA506	SKILL BASED LAB V - R PROGRAMMING	SKILL BASED LAB	2	1

COURSE DESCRIPTION

This course provides an in-depth knowledge on the basic constructs and statistical analysis in R.

COURSE OBJECTIVE

- Understand the basic constructs of R Programming.
- Analyze the statistical operations using R.

LAB LIST

1. Exercises to understand the R basics.
2. Exercises to understand the programming constructs of R
3. Exercises to draw a scatter diagram and charts.
4. Exercises to implement statistical operations in R
5. Exercises to implement concepts of probability and distributions in R

III MCA

SEMESTER – VI

(For those who join in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	19MCA602	INTERNET OF THINGS	MAJOR CORE	-	4

COURSE DESCRIPTION

This course provides the knowledge required to design an IOT system to connect embedded sensors.

COURSE OBJECTIVE

- Learn the fundamentals of IoT
- Understand the design methodology of IoT applications
- Design IoT applications using Raspberry Pi

UNIT – I FUNDAMENTALS OF IOT (12 Hours)

Introduction-Characteristics-Physical design – Things in IoT - Protocols – Logical design of IoT – Functional blocks – communication models – communication API s – IoT Enabling technologies – IoT Levels and deployment templates.

SELF STUDY: Characteristics

UNIT - II DOMAIN SPECIFIC IOTs (12 Hours)

Domain Specific IoTs – Introduction – Home Automation – Cities – Environment – Energy – Retail – Logistics – Agriculture – Industry – Heath and Life style

IoTand M2M – Introduction – M2M – Difference between IoT and M2M - SDN and NFV for IoT.

SELF STUDY: Home Automation

UNIT – III IOT PLATFORMS DESIGN METHODOLOGY (12 Hours)

Introduction – IoT Design Methodology-IOT physical devices and Endpoints – IoT Device – Raspberry Pi – Linux on Raspberry Pi - Raspberry Pi interfaces – Programming Raspberry Pi with Python.

SELF STUDY: IoT Device

UNIT – IV IOT PHYSICAL SERVERS AND CLOUD OFFERINGS (12 Hours)

Introduction to cloud storage models and communication API s – Python web application framework –Django – Designing a RESTful web API – Amazon web services for IoT

SELF STUDY: Introduction to cloud storage

UNIT – V CASE STUDIES ILLUSTRATING IOT DESIGN (12 Hours)

Introduction – Home automation – Cities – Environment – Agriculture – Productivity Applications.

SELF STUDY: Agriculture

REFERENCES:

1. ArshdeepBahga, Vijay Madisetti,"Internet of Things – A hands-on approach", Hyderabad Universities Press, 2015
2. Honbo Zhou,"The Internet of Things in the Cloud : A Middleware Perspective", Newyork : CRC Press , 2012
3. Dieter Uckelmann; Mark Harrison; Florian Michahelles (Eds.) "Architecting the Internet of Things", Germany: Springer,2011.
4. David Easley and Jon Kleinberg, " Networks, Crowds, and Markets: Reasoning About a Highly Connected World" United Kingdom: Cambridge University Press, 2010
5. Olivier Hersent, Omar Elloumi and David Boswarthick, "The Internet of Things: Applications to the Smart Grid and Building Automation", United States : Wiley Publishing Inc, 2012

WEB REFERENCES:

1. https://lecturenotes.in/subject/370/internet-of-things-iot
2. http://www.cs.ust.hk/~qianzh/FYTGS5100/spr2013/notes/Chapter1-IoT.pdf

ADVANCE LEARNERS COURSE - MCA

(For those who join in 2019 onwards)

PROGRAMME CODE	COURSE CODE	COURSE TITLE	CATEGORY	HRS/WEEK	CREDITS
MCA	19MCAAL01	HUMAN COMPUTER INTERACTION	ADVANCED LEARNERS	4	4

COURSE DESCRIPTION

This course introduces the fundamental theories and concepts of human computer interaction.Itprovides knowledge on analyzing interaction problems from a technical, cognitive and functional perspective.

COURSE OBJECTIVE

- Learn the foundations of Human Computer Interaction
- Be familiar with the design technologies for individuals and persons with disabilities
- Be aware of mobile HCI
- Learn the guidelines for user interface.

UNIT I **(12 Hours)**

FOUNDATIONS OF HCI

The Human: Introduction – Input/Output Channels – Human Memory – Thinking: Reasoning and problem solving;

The Computer: Introduction – Text entry Devices – Positioning, pointing and drawing – Display devices – Devices for virtual reality and 3D interaction -Memory – Processing and networks;

SELF STUDY: Devices for virtual reality and 3D interaction

UNIT II **(12 Hours)**

THE INTERACTION: Models of interaction – Models of interaction – Frameworks and HCI – Ergonomics – Interaction styles – Elements of the WIMP interface – Interactivity- the context of the interaction

PARADIGMS : Introduction – Paradigms for interaction

SELF STUDY: Interactivity- the context of the interaction

UNIT III **(12 Hours)**

INTERACTION DESIGN BASICS:Introduction – the process of design – User focus – the process of design – scenarios – navigation design – screen design – Iteration and prototyping.

HCI IN SOFTWARE PROCESS: Introduction – software life cycle – usability engineering – Prototyping in practice – design rationale.

SELF STUDY:software life cycle

UNIT IV **(12 Hours)**

DESIGN RULES: Introduction – principles to support usability- standards - guidelines – rules and heuristics – HCI patterns.

EVALUATION TECHNIQUES: Goals of evaluation – evaluation through expert analysis – evaluation through user participation – choosing an evaluation method.

SELF STUDY: HCI patterns , Choosing an evaluation method.

UNIT V **(12 Hours)**

UNIVERSAL DESIGN: Introduction – Universal design principles – Multi modal interaction – Designing web sites for screen readers – choosing the right kind of speech – Designing for diversity

USER SUPPORT: Introduction – Requirements of user support – Approaches to user support –Adaptive help systems

SELF STUDY:Designing for diversity , Approaches to user support

REFERENCES:

1. Alan Dix, Janet Finlay , “Human-Computer Interaction”,3rd edition, Pearson India
2. UzmaShaheen, Shweta Saini , ”Human Computer Interaction”, A. B. Publication
3. Dan Olsen, “Human Computer Interaction”, Ceneage Learning India Pvt Ltd
4. Preece, Rogers, Sharp,“Interaction Design : Beyond Human - Computer Interaction”, Wiley Publication
5. Cohen, Jacobs, Shneiderman, Plaisant, “Designing the User Interface: Strategies for Effective Human-Computer Interaction”, Pearson Education

WEB RESOURCES:

1.https://www.hcibib.org/

2.https://www.interaction-design.org/literature/topics/human-computer-interaction

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