



**Marwadi**  
University  
Marwadi Chandarana Group



**Faculty of Computer Applications**

**Master of Computer Applications**

**MCA**

**(Online)**

**PROGRAMME GUIDE**

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## 1. ABOUT MARWADI UNIVERSITY

Marwadi Education Foundation's Group of Institutions (MEFGI), established in 2008 under the Bombay Public Trust Act 1950, is an organ of the Marwadi Education Foundation. It is among the 4% Indian institutions accredited with NAAC A+ Grade and the only one in Gujarat. Marwadi University is promoted by Marwadi Shares and Finance Limited (MSFL), a major stock broking company & Chandarana Intermediaries Brokers Pvt. Ltd. (CIBPL), a leading firm dealing in technical and arbitrage trading. Spread across 40-acres campus, it is home to 9000+ students from 22 countries enrolled in diverse programs taught by 500+ educators that include 100+ Ph.D. faculty offering a unique blend of quality education, industry connect and global exposure, at a very affordable cost in a safe and secure environment of Rajkot.

### Our Vision

To foster an environment that empowers people, organizations, and societies through education, ideas, research, and training.

### Our Mission

- To provide quality education and thereby bring social transformation
- To create leaders through innovation and entrepreneurship
- To cultivate the culture of research advancements
- To imbibe universal consciousness
- To stimulate growth through industrial and international partnerships.

### Our core values

#### LEADER

- Lifelong Learning
- Empathy
- Adaptability
- Diversity
- Empowerment
- Respect

## 2. Programme's Mission and Objectives

### • Mission:

To set an example for the unreached and empower them to pursue high-quality, distance-learning higher education by providing them with a high-quality, learner-centric system.

The goal of the MCA program's distant learning format is to generate Master of Computer Applications graduates who are prepared to contribute to society in novel ways.

### • Objectives:

Students in the MCA degree program gain the knowledge and skills necessary for success in these competitive, rapidly changing fields in information technology.

The Programme Objectives of MCA programme are:

- 1) An ability to apply knowledge of mathematics, science, and Computer Science.
- 2) An ability to design and conduct experiments, as well as to analyze and interpret data.
- 3) An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- 4) An ability to function on multidisciplinary teams.
- 5) An ability to identify, formulate, and solve computer science problems.
- 6) An understanding of professional and ethical responsibility.
- 7) An ability to communicate effectively.
- 8) The broad education necessary to understand the impact of computer solutions in a global, economic, environmental, and societal context.
- 9) Recognition of the need for, and an ability to engage in life-long learning.
- 10) Acknowledge of contemporary issues.
- 11) An ability to use the techniques, skills, and modern software tools necessary for developing practice.

### **3. Relevance of the programme with HEI's Mission and Goals:**

#### **University Mission:**

- To provide quality education and thereby bring social transformation
- To create leaders through innovation and entrepreneurship
- To cultivate the culture of research advancements
- To imbibe universal consciousness
- To stimulate growth through industrial and international partnerships.

The mission of this course is achieving the Marwadi University mission and goals and the study of master's degree in computer application will provide adequate coverage of the discipline of computer science. The study of computer Science will prepare the students for life as informed, aware and awakened citizens ready to participate in IT Sector within country and abroad. It will deepen their technical skill and encourage them to involve in research.

- 1) MCA degree holder can start up their career prospects either in Government or private sector since here are a lot of employment opportunities in them.

- 2) Job opportunities can be found in software and hardware companies.
- 3) Opportunities for placement of the MCA degree holders are plenty as they undergo vigorous training in Programming Languages, Software Package, Mathematics, Project work etc.
- 4) On the completion of the MCA programme, students become eligible to join Ph.D. programme. They can be employed as Software Engineers, System Programmers, etc., in software/ IT industries.
- 5) By providing quality education and necessary infrastructure & facilities to the unreached from far flung places.
- 6) To provide opportunity to all eligible and motivate persons who couldn't pursue their higher education in more economical way.
- 7) Better masters in Computer applications can fulfill the current requirement of society, government and others.
- 8) To create a conducive learning environment.
- 9) To provide an educational delivery system that is flexible, technology driven meets the prevailing requirements and is cost effective.
- 10) This program delivers required theoretical and industry inputs to students that develops creative thinking to make them experts and professionals in the field.

#### **4. Nature of prospective target group of learners:**

The MCA courses aim for the development of knowledge modules having the right content to take care of the aspirations of academic community and to address to the personalized and industrial needs of the learners under low level of disposable income, rural dwellers, women, unskilled men, minorities, disabled, etc. It will be open to all persons residing in any part of India and abroad irrespective of race, creed or class subject to the fulfillment of minimum qualifications prescribed for admission.

This Programme duration will be two year. Admission into this computing programme for students, who have done their graduations in any discipline and are interested in taking computing/IT as a career. The mode of teaching is English. The detailed is mentioned in separate page.

It aims to provide opportunities to those aspirants who are either working or want to enhance their education level and technical skill while they are not able to attend regular colleges or university.

## **5. Appropriateness of programme to be conducted in Open and Distance Learning**

### **mode to acquire specific skills and competence:**

As India is inching towards Digital India, huge number of literates/graduates/Masters in Computer Applications is required to meet the challenge. As the current educational system (in regular mode) couldn't provide such a huge numbers of professionals the Open Distance learning mode will compensate deficiency. It will provide for a comprehensive and purposeful engagement between the teacher and the taught through a well-planned instructional package.

Given its scope, the program will benefit aspirants seeking to develop skills, improve competency, and build expertise in the fast growing Computing Industry. It selects modern computing tools and techniques and uses them with dexterity.

## **6. Instructional Design**

**Course Curriculum :** Institution adopts specialized approach where the task involved in course design & development is assigned to professionals in the particular department of the university and/or external experts. A draft with the objectives in prepared. It is evaluated by Institution that in turn composes a team of experts to have judicious review of the proposed course that it meets the objectives of distance education.

**Program Structure :** Institution constitutes a team of experts to review the course structure. The review team provides its feedback and recommendations to the concern faculty. In case of any modifications suggested by the review team, the curriculum of the course is re worked upon.

**Study Materials :** The study material is Self-Learning (SLM) format, which is the essence of standard distance learning Programs. Thus Institution initiates to develop all materials in SLM format. Experts both internal & external to write the study material on the specific guidelines lay down by statutory body.

**Review by Board of Studies :** The course is meticulously reviewed by BOS. Recommendations of BOS are implemented on priority. It also checks & defines the applicability, credit hours, scheme of examination for the course.

**Approval by Academic Council :** Finally, the course is submitted to the Academic Council of the University for Final Approval.

Programs are offered on semester basis. A modular approach towards pursuing a long term degree Program is implemented. Academic activities are linked together to engage learner and maximize learning.

### PG Programme Outcomes

Programme Outcomes No.	Programme Outcomes	Bloom's level
PO 1	An ability to apply knowledge of mathematics, science, and Computer Science	Apply
PO 2	An ability to design and conduct experiments, as well as to analyze and interpret data	H.O.T.S.
PO 3	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability	Evaluation
PO 4	An ability to function on multidisciplinary teams	Analyze
PO 5	An ability to identify, formulates, and solves computer science problems	H.O.T.S.
PO 6	An understanding of professional and ethical responsibility	Understand
PO 7	An ability to communicate effectively	Apply
PO 8	The broad education necessary to understand the impact of computer solutions in a global, economic, environmental, and societal context	Understand
PO 9	Recognition of the need for, and an ability to engage in life-long learning	Analyze
PO 10	A knowledge of contemporary issues,	Remember
PO 11	An ability to use the techniques, skills, and modern software tools necessary for developing practice.	Apply

### Programme Specific Outcomes (PSO): MCA

Sr.No	Programme Specific Outcomes
PSO 1	To design and develop efficient algorithms for real world problems.
PSO 2	Design, develop, test and maintain desktop, web, mobile and cross-platform software applications using modern tools and technologies.
PSO 3	Develop the ability to carry out research, experiment, contemporary issues etc. to solve industrial problems.

**FACULTY OF COMPUTER APPLICATIONS**  
**Master of Computer Applications**

**MCA SEMESTER - 1**

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0101	DATA STRUCTURE USING C	5	15	30	25	25	55	30	40	30
05MC0102	WEB APPLICATION DEVELOPMENT USING PHP	2	6	12	10	10	22	30	NA	70
05MC0103	OBJECT ORIENTED PROGRAMMING USING JAVA	5	15	30	25	25	55	30	40	30
05MC0104	OPERATING SYSTEMS	5	15	30	25	25	55	30	40	30
05MC0105	RELATIONAL DATABASE MANAGEMENT SYSTEM	4	12	24	20	20	44	30	40	30
05MC0106	MOOC - HTML / CSS / JS	2	6	12	10	10	22	0	0	0
<b>Total</b>		<b>23</b>	<b>69</b>	<b>138</b>	<b>115</b>	<b>115</b>	<b>253</b>	<b>150</b>	<b>160</b>	<b>190</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Master of Computer Applications**

**MCA SEMESTER - 2**

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0201	COMPUTER NETWORKS	5	15	30	25	25	55	30	40	30
05MC0202	PYTHON PROGRAMMING	5	15	30	25	25	55	30	40	30
05MC0203	MOBILE PROGRAMMING	5	15	30	25	25	55	30	40	30
05MC0204	Mini Project – 1	2	6	12	10	10	22	NA	NA	100
05MC0205	Electives - 1									
05MC0206	NoSQL DATABASES	4	12	24	20	20	44	30	NA	70
05MC0207	IMAGE PROCESSING									
05MC0208	DATA ANALYTICS AND VISUALIZATION									
05MC0209	C#.NET									
05MC0209	MOOC - Node / Angular / Express / React JS	2	6	12	10	10	22	0	0	0
05SSL0205	COMMUNICATION SKILLS	1	3	6	5	5	11	30	NA	70
<b>Total</b>		<b>24</b>	<b>72</b>	<b>144</b>	<b>120</b>	<b>120</b>	<b>264</b>	<b>150</b>	<b>120</b>	<b>330</b>

**FACULTY OF COMPUTER APPLICATIONS**  
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**MCA SEMESTER - 3**

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0301	Software Engineering	5	15	30	25	25	55	30	70	NA
05MC0302	Cryptography	5	15	30	25	25	55	30	40	30
05MC0303	Artificial Intelligence	5	15	30	25	25	55	30	70	NA
05MC0304	Mini Project – 2	2	6	12	10	10	22	NA	NA	100
05MC0305	Electives - 2 Big Data Tools	4	12	24	20	20	44	30	NA	70
05MC0306	Machine Vision									
05MC0307	Machine Learning									
05MC0308	ASP.Net Programming									
05MC0309	MOOC – Cloud Computing	2	6	12	10	10	22	0	0	0
05CE0301	Corporate Etiquettes	1	3	6	5	5	11	30	NA	70
<b>Total</b>		<b>24</b>	<b>72</b>	<b>144</b>	<b>120</b>	<b>120</b>	<b>264</b>	<b>150</b>	<b>180</b>	<b>270</b>

**FACULTY OF COMPUTER APPLICATIONS**  
**Master of Computer Applications**

**MCA SEMESTER - 4**

MCA (MASTERS OF COMPUTER APPLICATIONS) Course Details : Sem - 4										
Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0401	Industry Defined Project (Internship)	20	NA	NA	NA	NA	NA	NA	NA	100
	<b>Total</b>	<b>20</b>						<b>0</b>	<b>0</b>	<b>100</b>

## 7. Procedure for admissions, curriculum transaction, evaluation and medium of instruction:

**Eligibility:** A candidate shall have passed the qualifying examination of B.C.A./ B.Sc. (Computer Science)/B.Sc. (IT) / B.E. (CSE)/ B.Tech.(CSE) / B.E. (IT) / B.Tech. (IT) or equivalent Degree or passed any graduation degree (e.g.: B.E. / B.Tech. / B.Sc. / B.Com. / B.A./ B.Voc./ etc.,) preferably with Mathematics, Business Mathematics or statistics at 10+2 level or at Graduation level. For students having no Mathematics background compulsory bridge course will be framed by the respective University/ Institution and additional bridge courses related to computer subjects as per the norms of the concerned University.

**Examination:** CDOE is an institution owned and controlled by the authority of Marwadi University. The examination in respect of CDOE students is conducted by the Marwadi University. All matters relating to the examinations, i.e., result mark sheet, degree etc. are dealt with the controller of the examination.

**Evaluation:** Though evaluations of Assignments / Seminar / class test / tutorial etc. are conducted to evaluate the students 30%, yet the final evaluation 70% is done through Term End Examination (weight age: 100%). Evaluations of the MCA course are done by table marking process.

**Curriculum Transaction:** In the MCA course, we impart instructions mainly through Lecture method during the Personal Contact Programme. We also make use of smart class room. The printed study material is sent to the students by post. Efforts are afoot to provide the study material in soft copies to the learners and to provide them the facility to download the study material from the website through their respective student ID.

**Medium of Instruction:** The medium of instruction in MCA is in English. The study material will be made available to the student in English language. The lectures in personal contact programme are generally delivered in English.

## Center for Distance and Online Education

### Evaluation Procedure

#### 1. Assessment/Evaluation Procedure:

- 1.1 In the case of a multi-section/teacher course, a course/subject coordinator is appointed by the department faculty Coordinator (FC), and the following procedure shall be followed by the course/subject coordinator in consultation with the team of faculty members.
- 1.2 The academic performance of a student is evaluated by the concerned instructor with the approval from the department coordinator, except in the case of project work where other examiners may be nominated from the University for the viva voce.
- 1.3 The student's performance in each course, in general, is evaluated based on *in-semester continuous assessment*, *end-semester examination*, and *End-Term Practical/Project (ETP)* [for Practical/Project/Term Paper/Dissertation courses]

An *in-semester continuous assessment* (also known as comprehensive assessment) (CSE) is spread through the duration of the course and is done by the teacher teaching the course with a weightage of 30%. The assessment is done through various means including:

- |                      |                                      |
|----------------------|--------------------------------------|
| 1. Attendance        | 7. Projects                          |
| 2. Tutorials         | 8. Seminars                          |
| 3. Assignment        | 9. Group discussions/activities etc. |
| 4. Surprise Test     | 10. any other specified by FC        |
| 5. MCQ-based quizzes |                                      |
| 6. Presentations     |                                      |

The *end-semester examination* shall have an assessment from the following perspective with respect to all courses:

1. Evaluation with respect to remembering.
2. Evaluation with respect to knowledge.
3. Evaluation with respect to Understanding.
4. Evaluation with respect to skill.
5. Evaluation with respect to Applications
6. Higher Order Thinking Skills

The assessment method is further detailed below:

**(a) Course with only Theory component-**

<b>Assessment tool</b>	<b>Weightage</b>	<b>Remarks</b>
<b>Continuous Assessment (CSE):</b> 1. Attendance 2. Tutorials 3. Assignment 4. Surprise Test 5. MCQ based quizzes 6. Presentations 7. Projects 8. Seminars 9. Group discussions/activities etc. 10. any other specified by FC	30 %	As decided and announced by the teacher concerned in the class at the beginning of the course.
<b>End semester Examination (ESE)</b>	<b>70%</b>	<b>Duration–2 hours</b>

**(b) Course with both theory and practical component**

- (i) The theory and practical portions shall be assessed combinedly.
- (ii) Assessment for practical component is as given below:

<b>Assessment tool</b>	<b>Weightage</b>	<b>Remarks</b>
<b>Continuous Assessment (CSE):</b> 1. Attendance 2. Tutorials 3. Assignment 4. Surprise Test 5. MCQ based quizzes 6. Presentations 7. Projects 8. Seminars 9. Group discussions/activities etc. 10. any other specified by FC	30 %	As decided and announced by the teacher concerned in the class at the beginning of the course.
<b>End semester Examination (ESE)</b>	<b>40%</b>	<b>Duration–2 hours</b>
<b>End Term Practical (ETP)</b>	<b>30%</b>	<b>Assessment components:</b> Carrying out practical/project and submission of record & viva-voce.

**(c) Course with only practical component**

Assessment tool	Weightage	Remarks
<b>Continuous Assessment (CSE):</b>	30 %	Carrying out practical/project and submission of record
<b>End Term Practical (ETP)</b>	<b>70%</b>	<b>Assessment components:</b> Carrying out practical/project and submission of record & viva-voce.

**(d) Course with an only Project component**  
 (including term paper/dissertation/project-based courses)

Assessment tool	Weightage	Remarks
<b>End Term Practical (ETP)</b>	<b>100%</b>	<b>Assessment components:</b> Carrying out submission of term paper/dissertation/project record & viva-voce.

The following table summarizes the evaluation components and their weightages for Online & Distance Learning (ODL) Programmes:

Category of Course	Exam Weightage		
	CSE	ESE	ETP
Courses with only theory component	30%	70%	NA
Courses with only practical component	30%	NA	70%
Courses with both theory and practical component	30%	40%	30%
Courses with only project component (including Term Paper, Dissertation and Project based courses)	NA	NA	100%

**1.4 Structure for Grading of Academic Performance:**

**1.4.1. Letter Grades and Grade Points (GP):**

Based on the performance, each student is awarded a final letter grade at the end of each semester against each Course. The letter grades and the corresponding grade points are as follows:

Letter Grade	Grade Points
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
D (Pass)	4
F (FAIL)	0
Ab (Absent)	0

### The range for Grade Using Relative Grading System: Large Classes (>25 students)

For large classes (>25 students) the grading should follow a normal distribution for the award of the grade in the course. The marks obtained out of 100 would be converted into grades following the guidelines given below:

The mean ( $\mu$ ) and the standard deviation ( $\sigma$ ) of marks obtained by all the students in a course shall be calculated. The grades shall be awarded to a student depending upon the marks and the ranges as per table given below:

Letter Grade	Grade Points	Lower Range -Upper Range
O (Outstanding)	10	$\geq \text{Mean} + 1.5 \sigma$
A+ (Excellent)	9	$\text{Mean} + 1.0\sigma \leq \text{to} < \text{Mean} + 1.5 \sigma$
A (Very Good)	8	$\text{Mean} + 0.5 \sigma \leq \text{to} < \text{Mean} + 1.0 \sigma$
B+ (Good)	7	$\text{Mean} \leq \text{to} < \text{Mean} + 0.5 \sigma$
B (Above Average)	6	$\text{Mean} - 0.5 \sigma \leq \text{to} < \text{Mean}$
C (Average)	5	$\text{Mean} - 1.0 \sigma \leq \text{to} < \text{Mean} - 0.5 \sigma$
D (Pass)	4	$\text{Mean} - 1.5 \sigma \leq \text{to} < \text{Mean} - 1.0 \sigma$
F (FAIL)	0	$< \text{Mean} - 1.5 \sigma$
Ab (Absent)	0	Failure due to insufficient attendance in the course / Not submitted Term work

### Range for Grade Using Absolute Grading System: Small Classes ( $\leq 25$ students)

For small classes ( $\leq 25$  students) the grades shall be awarded on the basis of absolute marks as given in the table below:

Letter Grade	Grade Points	Normalized Mark range
O (outstanding)	10	90-100
A+ (Excellent)	9	80-89
A (Very Good)	8	70-79
B+ (Good)	7	60-69
B (Above Average)	6	50-59
C (Average)	5	40-49
D (Pass)	4	35-39
F(Fail)	0	Failure due to in sufficient marks in the course OR Failure due to non-appearance in examination (Ab-Absent)
Ab (Absent)	0	Failure due to insufficient attendance in the course/ Not submitted Term work

For **Non-credit/Audit courses** “S” (Satisfactory) or “U” (Unsatisfactory) shall be indicated instead of the letter grade, and this will not be counted for the computation of SGPA/GPA/CGPA.

- For UG/DIPLOMA Students: Students having 35% or more marks should not be awarded the failing grade “F”. For PG Students: Students having 40% or more marks should not be awarded the failing grade “F”.  
However, for a student to get a grade of “D” or above in any course, he/she would have to appear in the End Examinations.
- If The student fails due to not submitting Term/Course work or due to short of attendance, an “F (Ab)” grade is awarded to the student.
- A student can be awarded the highest grade “O”, if secured 70% or more marks.
- For online/distance learning programs in any semester, a student obtaining ‘C or D’ grade in any course/s with an overall SGPA/GPA of 5.0 and above shall be declared to have earned the full credits of that semester.

**1.4.2** A student is considered to have successfully completed a course and earned the credits if he/she secured a letter grade other than **F or Ab** in that course. *A letter grade of F or Ab in any course implies a failure in that course.*

### **1.4.3 Computation of Semester/Year Grade Point Average (SGPA/GPA) and Cumulative Grade Point Average (CGPA)**

(i) The SGPA/GPA will be calculated according to the formula

$$SGPA/GPA = \frac{\sum_1^n c_i \times (GP)_i}{\sum_1^n c_i}$$

Where  $C_i$ =credit for the  $i^{th}$  course,  $(GP)_i$  is the grade point obtained for the  $i^{th}$  course,  $n$ =total number of courses and the sum is over all the courses taken in that semester/year, including those in which the student has secured F grades.

(ii) For the cumulative grade point average (CGPA) following formula is used:

$$CGPA = \frac{\sum_1^r S_i \times (SGPA)_i}{\sum_1^r S_i}$$

Where  $S_i$ =Sum of credits in  $i^{th}$  semester/year,  $(SGPA)_i$ =Semester Grade Point Average earned in  $i^{th}$  semester/year and  $r$ =number of semester/year and the sum is over all the semesters under consideration.

(iii) The SGPA/GPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

An example of these calculations is given below:

<b>I Semester</b>					
Subject Code	Credits	Grade Awarded	Earned Credits	Grade Points	Point Earned/ Secured
(1)	(2)	(3)	(4)	(5)	(6)
01MA0101	4	C	4	5	20
01EE0101	4	D	4	4	16
01GS0101	4	A+	4	9	36
01SL0101	3	B+	3	7	21
01EE0102	4	C	4	5	20
01ME0101	1	D	1	4	4
01PE0101	3	A	3	8	24
Credits Registered in the I semester (total of column 2)				=	23
Earned Credits in the I semester (total of column 4)				=	23
Point secured in the I semester (total of column 6)				=	141
<b>SGPA (I Semester)</b>		=	<b>6</b>		
<b>CGPA (I Semester)</b>		=	<b>6</b>		

<b>II Semester</b>					
Subject Code	Credits	Grade Awarded	Earned Credits	Grade Points	Point Earned/ Secured
(1)	(2)	(3)	(4)	(5)	(6)
01MA0102	3	C	3	5	15
01EC0101	1	D	1	4	4
01EN0101	1	A+	1	9	9
01CI0101	3	B+	3	7	21
01ME0103	4	C	4	5	20
01CE0101	4	D	4	4	16
01CR0101	4	A	4	8	32
01MA0103	3	C	3	5	15
Credits Registered in the II semester (total of column 2)				=	23
Earned Credits in the II semester (total of column 4)				=	23
Point secured in the II semester (total of column 6)				=	132
<b>SGPA (II Semester)</b>		=	<b>5.7</b>		
<b>CGPA (II Semester)</b>		=	<b>(141 + 132) / (23+23)</b>	<b>5.9</b>	

#### 1.4.4 Conversion of grades into percentages

The performance of the student is measured in terms of CGPA (on a 10 point scale) as defined above. However, on request from the Indian Industry and oversees institutes querying on percentage obtained by students, a mathematical formula for conversion of CGPAs to equivalent percentage has been adopted and same is approved by the Academic council of the University.

Formula for conversion of equivalent percentage of grades/CGPA:

$$\text{Percentage marks} = \text{CGPA} \times 10$$

**1.4.5** Class/Distinction will be awarded to the students after they successfully complete the programme as per the norms stipulated in the following table:

CGPA	Class	Percentage (%)
Below 5.0	Pass Class	35-49.99 %
5.0 and above	Second Class	50-59.99%
6.0 and above	First Class	60-69.99 %
7.0 and above	First Class with Distinction	70% or above

The degree shall be conferred to students based upon CGPA (Cumulative Grade Point Average) considering all the semesters/year's performance.

## 2. The Process and conduct of different Evaluation components:

**2.1. Continuous Assessment (CSE):** The continuous assessment of ODL learners for each course is decided as per mentioned various rubrics by FC (as per 1.3).

**2.2. End Semester Examinations (ESE):**

**Question Paper:** The format of the question paper will be multiple-choice questions with duration of 2 hours. The examination will consist of 80 questions of different levels of difficulties. 50 questions of Easy level & 1 mark each, 20 questions of medium level difficulty & 1.5 mark each and 10 questions of high level with carrying 2 mark each. Examinee might ask to provide short/long descriptive answer as per the questions need/requirement.

## 3. Instructions for attending End Semester Examinations

### a) Online Proctored Examination

Exams are strictly timed and accessible through the University Examination Application. Students must ensure a well-lit, quiet environment with stable internet connectivity and proper seating arrangements. Logging in 15 minutes before the start time of the exam is mandatory, with a limited grace period for late logins. The exam format includes multiple-choice questions with varying difficulty levels and may include descriptive answers. No retakes or re-answering of questions is allowed once time is up. The exam session can be ended by the student or automatically upon completion of the allotted time or by the proctor.

### b) Secure browser/Operation System

The student must use compatible devices to appear for the examinations.

Developer mode should be disabled, and the device should not be rooted.

All necessary device permissions must be granted to the Examination Applications.

Ad blockers and popup blockers should be turned off, and the device should not be connected to other devices.

**c) Use of Technology & Power Backup**

A stable internet connection (at least 25 Mbps) is crucial, and sitting near the Wi-Fi router is recommended. No power-related issues should arise, and the device should preferably be fully charged.

**d) Remote Proctoring:**

Various activities are prohibited during exams, including device or network changes, accessing messages or calls, and using other applications. Continuous monitoring via remote proctoring captures images of the student's face at regular intervals. Any suspicious activity is recorded and may lead to immediate termination of the exam, with further actions taken as per university regulations.

**4. Re-appearing the Examinations:**

- 4.1** No student having passing % marks should be awarded the failing grade “F”, he/she would be required to re-appear in the Course Examination.
- 4.2** The student fails due to not submitting Term/Course work or due to short of attendance, “F (Ab)” grade is awarded to the student. Students would be required to re-appear in the Course Examination in the next term.
- 4.3** If a student opts for re-appearing in an examination of a course after securing “F” grade, The student need not to attend the regular classes for that course.
- 4.4** All applicable fees charged against examination shall apply for re-appearance courses as well.

**5. Attendance:**

An examinee should have an attendance of at least 75% (calculated based on his/her involvement with the resources on LMS, live classes, master classes, e-tutorials, discussion forums, etc.) to be eligible to appear for the end-semester examination.



**Marwadi**  
University  
Marwadi Chandarana Group



# **Faculty of Computer Applications**

**Master of Computer Applications**

**MCA Sem - 1**

**Teaching Scheme**

**&**

**Syllabus**

**FACULTY OF COMPUTER APPLICATIONS**  
**Master of Computer Applications**

**MCA SEMESTER - 1**

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0101	DATA STRUCTURE USING C	5	15	30	25	25	55	30	40	30
05MC0102	WEB APPLICATION DEVELOPMENT USING PHP	2	6	12	10	10	22	30	NA	70
05MC0103	OBJECT ORIENTED PROGRAMMING USING JAVA	5	15	30	25	25	55	30	40	30
05MC0104	OPERATING SYSTEMS	5	15	30	25	25	55	30	40	30
05MC0105	RELATIONAL DATABASE MANAGEMENT SYSTEM	4	12	24	20	20	44	30	40	30
05MC0106	MOOC - HTML / CSS / JS	2	6	12	10	10	22	0	0	0
<b>Total</b>		<b>23</b>	<b>69</b>	<b>138</b>	<b>115</b>	<b>115</b>	<b>253</b>	<b>150</b>	<b>160</b>	<b>190</b>

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- **Sem.** : 1
- **Subject Code** : 05MC0101
- **Subject** : Data structure using C
- **Course Objectives** :
  1. To understand concept of algorithm analysis and data structure.
  2. To understand stack and queue with its applications.
  3. To understand linked list with its applications.
  4. To work with Tree and Graph.
  5. To compare different searching and sorting techniques.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisite:** Knowledge of C programming language

Unit No	Topics Covered
<b>1</b>	<b>Introduction to Data Structures:</b> Introduction of Data Structure, Data Representation, Abstract Data Type, Data Types, Primitive Data Types, Data Structure and Structured Type, Atomic Type, Difference between Abstract Data Type, Data Types and Data Structures <b>Analysis of Algorithm :</b> Algorithms, Different Approaches to Designing an Algorithm, Complexity, Big O notation, Algorithm Analysis
<b>2</b>	<b>Stack :</b> Concept of Stack, Stack operations (ADT), Stack using Array, stack applications – expression evaluation and conversion (Infix to postfix and Infix to Prefix) and Recursion (Use of Stack in Recursion, Execution of Recursive call using Factorial, Recursion v/s Iteration, Tower of Hanoi), Stack using Linked List

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	<p><b>Queue :</b> Concept of Queue, Queue operations (ADT), Types of Queue – Simple queue, Circular queue, Deque, Priority queue, Applications of Queue, Queue using Linked List</p>
<p align="center"><b>3</b></p>	<p><b>Linked Lists :</b> Introduction, Array v/s Linked List, Types of Linked List – Singly Linked List, Doubly Linked List, Circular Singly Linked List and Circular Doubly Linked List</p> <p><b>Operations on Linked List - (For all the types of Linked list)</b></p> <ol style="list-style-type: none"> <li>1] Create</li> <li>2] Display</li> <li>3] Insert <ul style="list-style-type: none"> <li>o insert first</li> <li>o insert last</li> <li>o insert before desired</li> <li>o insert after desired</li> </ul> </li> <li>4] Delete <ul style="list-style-type: none"> <li>o delete first</li> <li>o delete last</li> <li>o delete before desired</li> <li>o delete after desired</li> </ul> </li> <li>5] Search particular element</li> <li>6] Sort list in ascending order</li> <li>7] Update an element.</li> <li>8] Count no. of nodes</li> </ol> <p><b>More operations on Singly linked list –</b></p> <ol style="list-style-type: none"> <li>1. Copying a linked list</li> <li>2. Length of linked list</li> <li>3. Reversing a linked list</li> <li>4. Concatenating two linked lists</li> </ol> <p><b>Application of Linked List –</b> Polynomial Manipulations, Sparse Matrix, Representation of Complex Numbers</p>
<p align="center"><b>4</b></p>	<p><b>Tree :</b> Introduction, Types of Trees, Binary Tree – Basic definitions of Binary Tree, Properties of Binary Tree, ADT of Binary tree, Representation of Binary Tree, Operations on Binary Search Tree, Binary Tree Traversal, Reconstruction of Binary Tree, Conversion of General Tree to Binary tree, Applications of Binary tree</p>

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	<p><b>Advanced Trees :</b> Binary Search Tree, AVL tree, 2 – 3 tree and B – tree, Threaded Binary Tree, Expression Tree</p> <p><b>Graph :</b> Introduction, Terms Associated with Graph, Representation of Graphs, Graph Traversal, Spanning Tree – Prim’s and Kruskal’s Algorithm, Shortest Path Algorithm (Dijkstra’s Algorithm), Applications of Graph</p>
<b>5</b>	<p><b>Searching :</b> Introduction, Search Techniques – Linear search, Binary search (Iteration and Recursion)</p> <p>Hashing : Introduction, Hash Functions, Collision Resolution Techniques (open addressing, chaining)</p> <p><b>Sorting :</b> Introduction, Sorting Techniques – Bubble sort, Insertion sort, Selection sort, Quick sort, Heap sort, Shell sort, Radix sort, Merge sort, Comparison of All Sorting Methods</p>

**Course Outcomes : (Students will be able to)**

1. Define the concept of data structure and categories of data structure.
2. Describe analysis of algorithm.
3. Demonstrate the concept and application of linear data structures like stack, queue and linked list.
4. Construct different types of trees and graphs and also find out the minimal spanning tree and shortest path by applying different algorithms.
5. Compare and contrast different searching and sorting techniques and find out better technique by calculating time and space complexity.

**Course Outcomes – Program Outcomes Mapping Table :**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H		L	H			L	H		M
CO2	L	H							M		H

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CO3	L	H							M		H
CO4	L	H							M		H
CO5	M	H							M		H

**Main Reference :**

1. Data Structures using C, ISRD Group, ACE Series, Tata McGraw Hill Publication, First Edition.

**Other References :**

1. An Introduction to Data Structures with Applications, Tremblay Tata McGraw-Hill Education, Second edition.
2. Introduction to Algorithms, Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, The MIT Press, 3rd Edition
3. Data Structures Using C, Reema Thareja, Oxford, Second Edition.
4. Data Structures Using C++, Varsha H. Patil, Oxford, First Edition.

**Web References :**

1. <https://www.programiz.com/dsa>
2. <https://www.geeksforgeeks.org/data-structures/>

**App References :**

1. AlgoPrep - Algorithms & Data structures Made Easy Pranit Krishna Kulkarni Education
2. Data Structures Handbook, Bash Overflow Education

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	1,2
2	6,7
3	4,5
4	8,9,10,12
5	11,13

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**PRACTICALS**

**Note : Practical using C programming language**

Unit No	List of Practicals
<p align="center"><b>2</b></p>	<p align="center">***** Stack *****</p> <p>1] Write a program which performs following stack operations. -&gt;push() -&gt; pop() -&gt; peep() -&gt; update()            2] Write a program to find out factorial of number using stack.            3] Write a program to print string in reverse order using stack.            4] Write a tower of Hanoi program.            5] Write a program of dynamic stack.</p> <p align="center">***** QUEUE *****</p> <p>1] Write a program which performs following operations using simple queue.  <input type="checkbox"/> <input type="checkbox"/> insert()-&gt; delete() -&gt; display()             2] Write a program which performs following operations using circular queue.  <input type="checkbox"/> <input type="checkbox"/> Insert()-&gt; delete() -&gt; display()             3] Write a program of dynamic queue.</p>
<p align="center"><b>3</b></p>	<p align="center">***** LINKED LIST *****</p> <p>Perform following operations :</p> <p>1] Create            2] Display            3] Insert              o insert first              o insert last              o insert desired              o insert before desired              o insert after desired</p> <p>4] Delete              o delete first              o delete last              o delete desired              o delete before desired              o delete after desired</p> <p>5] Search particular element</p>

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	<p>6] Sort list in ascending order          7] Update an element.          8] Count no. of nodes          ⇒ Write a program to perform above operations using singly linked list          ⇒ Write a program to perform above operations using doubly linked list          ⇒ Write a program to perform above operations using circular singly linked list          ⇒ Write a program to perform above operations using circular doubly linked list</p> <p>Linked List Application :</p> <ol style="list-style-type: none"> <li>1. Write a program to perform polynomial addition.</li> <li>2. Write a program to check the given matrix is sparse or not.</li> </ol>
<b>4</b>	<p align="center">*****TREE AND GRAPH*****</p> <p>1] Write a program to perform following operations on binary tree :          1. insert node          2. delete node          3. update node value</p> <p>2] Write a program to create a binary tree . Traverse tree in preorder , postorder and inorder.          3] Write a program to represent graph using linked list and implement for DFS and BFS algorithm for traversing.</p>
<b>5</b>	<p align="center">*****SORTING AND SEARCHING *****</p> <p>1] Enter N elements and arrange the elements using :  <input type="checkbox"/> Selection sort  <input type="checkbox"/> Bubble sort  <input type="checkbox"/> Insertion sort  <input type="checkbox"/> Quick sort  <input type="checkbox"/> Shell sort  <input type="checkbox"/> Merge sort</p> <p>2] Enter N elements and perform search operations using :  <input type="checkbox"/> Linear search  <input type="checkbox"/> Binary search (with recursion, without recursion)</p> <p>3] Write a program of hashing.</p>

**Requirement of Laboratory Support:**

Students need to install **Code Blocks** tool using the following link :

<https://www.codeblocks.org/downloads/>

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- **Sem.** : 1
- **Subject Code** : 05MC0103
- **Subject** : Web Application Development using PHP
- **Course Objectives:**
  1. To learn PHP scripting language and deploying application on Apache Web Server.
  2. To learn PHP Functions for web applications development.
  3. To design web application forms using cookies and session.
  4. To be able to develop web application using MySQL database.
  5. Students will be able to apply different functionalities, validations & animation on website using JavaScript.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	30	NA	70

- **Prerequisites** : Fundamentals of Web, HTML & JavaScript

Unit No	Topics Covered
<b>1</b>	<p><b>PHP Installation and Configuration:</b>            Current version of PHP &amp; MySQL, Apache Log file, PHP.INI file, XAMPP installation and basics of PHP scripts.</p> <p><b>PHP Overview Flow control and building blocks:</b>            Variables, Data types, Operators and expressions, Constants, Switching flow, Loops, Code blocks and browser Output. Comments, Include &amp; require function</p>
<b>2</b>	<p><b>Working with Functions, Arrays and Objects:</b>            What is a function, Calling function, Defining a function, Returning values from User-defined functions, Variable scope, arguments, Testing for the existence of a function, What are Arrays, Creating arrays, Some array related functions.</p> <p><b>Working with Strings, Date and Time:</b>            Formatting Strings with PHP, Investigating Strings in PHP, Manipulating Strings with PHP, Using Date and Time functions</p>

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	in PHP, Other String, Date and Time Functions.
<b>3</b>	<p><b>Working with Forms, Cookies and User Sessions:</b> Creating a Simple Input Form, Accessing Form Input with User-Defined Arrays, Combining HTML and PHP Code on a Single Page, Using Hidden Fields to Save State, Redirecting the User, Working with File Uploads.</p> <p>Introducing Cookies, Setting a Cookie with PHP, Deleting a Cookie with PHP Session Function(s) Overview, Starting a Session, Working with Session Variables, Passing Session IDs in the Query String, Destroying Sessions and Un-setting Variables, Using Sessions in an Environment with Registered Users.</p>
<b>4</b>	<p><b>Interacting with MySQL</b> Learning the MySQL Data Types, Frequently used String functions in MySQL, Using Date and Time functions in MySQL, Interacting with MySQL using PHP, MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data, PHPMyAdmin interface.</p>
<b>5</b>	<p><b>Apply JavaScript functionalities, Validations on forms</b> Java script conditional statements and loops, Dialog boxes, DOM, JavaScript User Define Function, JavaScript Built in Functions, Java Script form validations.</p>

**Course Outcomes:**

1. Students will be able to learn the Apache Web Server configuration
2. Students will be able to understand the concept of Web Application Design and development.
3. Students will be able to develop web application using open source technologies like PHP & MySQL.
4. Students will learn PHP scripting language and deploying application on Apache Web Server.
5. Students will be able to design and develop dynamic website using javascript.

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**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	L	M	H	L				
CO2					H	H		M
CO3		M			M	H		
CO4	M		M		L		H	
CO5		M		H				L

**Text Book :**

1. "Sams Teach Yourself PHP, MySQL and Apache All in One", Julie C Meloni, Pearson Education, 4th edition.
2. "ELOQUENT JAVASCRIPT", Marijn Haverbeke, No Starch Press, 3rd Edition.

**Reference Books :**

1. Beginning PHP 5.3, Matt Doyle, Wiley Publishing.
2. PHP6 and MySQL Bible –Steve Suehring, Tim Converse and Joyce Park – Wiley India Edition.
3. Head First PHP& MySQL by Lynn Beighley, Michael Morrison, O’Reilly Media.
4. PHP & MySQL development – Luke Welling – Pearson Education.
5. Web Technologies:HTML, JavaScript, PHP, Java, JSP ASP.Net, XML and AJAX Black Book - Kogent Learning Solutions - Dreamtech Press

**Web References:**

1. <https://www.codecademy.com/learn/learn-php>
2. <https://www.guru99.com/php-tutorials.html>

**App References:**

1. Udemy
2. Tutorialspoint
3. SoloLearn



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**Syllabus Coverage from Text book & web/app reference:**

<b>Unit #</b>	<b>Chapter Numbers</b>
1	Text Book-1: Chapter 5 & 6
2	Text Book-1: Chapter 7,8 & 10
3	Text Book-1: Chapter 11 & 12
4	Text Book-1: Chapter 15,16 & 18
5	Text Book-2: Chapter 1,2 & 3

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**PRACTICALS**

Unit No	List of Practical
1	<ol style="list-style-type: none"> <li>1. Write a PHP program for print Previous semester Result using variables &amp; constants in PHP.</li> <li>2. Write a PHP program to find out maximum and minimum number</li> <li>3. Write a PHP program for operators in PHP.</li> <li>4. Write a PHP program to print current month using if..else&amp; switch case.</li> <li>5. Write a PHP program to print 5 to 10 using For and ForEach.</li> <li>6. Write a PHP program to print 15 to 20 using While and Do While.</li> <li>7. Write a PHP program to include a file using include and require function</li> <li>8. Write a PHP Program to perform following operation on Array where values in array are entered by user               <ol style="list-style-type: none"> <li>a) Print the values of array.</li> <li>b) Reverse an array.</li> <li>c) merge two arrays in sorted manner.</li> <li>d) add values of all elements of an array.</li> </ol> </li> </ol>
2	<ol style="list-style-type: none"> <li>2.1 Write a PHP code to create numeric array for Monday to Saturday, associative array for month with total days of month such as January=&gt;30,February=&gt;28 upto December and multidimensional array for laptop along with company name inside that model and price(any two companies).</li> <li>2.2 Write a PHP code for sorting an array entered by user.</li> <li>2.3 Write a program to perform following array functions:               <ol style="list-style-type: none"> <li>1 array_change_key_case(\$var, CASE_LOWER/CASE_UPPER).</li> <li>2 array_chunk(\$var,size) //array of months</li> <li>3 array_count_values()</li> <li>4 array_combine()</li> <li>5 array_pop()</li> <li>6 array_push()</li> <li>7 array_unshift()</li> <li>8 array_shift().</li> </ol> </li> <li>2.4               <ol style="list-style-type: none"> <li>1 strlen() // any string</li> <li>2 strpos() //find some specific word,letter</li> <li>3 str_word_count()</li> <li>4 strrev()</li> <li>5 str_replace()</li> <li>6 strtolower()</li> <li>7 strtoupper()</li> </ol> </li> <li>2.5 Write a PHP code for Type casting with settype, gettype functions.</li> <li>2.6 Write a PHP code for user define function for calculator, take input from user by creating simple html form.</li> <li>2.7 Write a PHP code to use mysql string manipulation functions as given bellow: Length(),concat(),concat_ws(),trim(),rtrim(),ltrim(),lpad(),rpad(),locate(),strstr(),substr(),lcase(),ucase(),repeat(),replace().</li> </ol>

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	<p>2.8 Write a PHP code to use mysql date and time functions as given bellow: DAYOFWEEK(),WEEKDAY(),DAYOFMONTH(),DAYOFYEAR(),DAYNAME(),MONTH(),MONTHNAME(),WEEK(),NOW(),SYSDATE(),CURRENT_TIMESTAMP()</p> <p>2.9 Write a PHP code to use mysql date and time functions as given bellow: HOUR(),MINUTE(),SECOND(),DATE_FORMAT(),DATE_SUB(),DATE_ADD(),CURDATE()/CURRENT_DATE,CURTIME()/CURRENT_TIME(),UNIX_TIMESTAMP(),FROM_UNIXTIME().</p>
<b>3</b>	<p>3.1 create cookie</p> <p>3.2 read cookie</p> <p>3.3 use cookie with header</p> <p>3.4 delete cookie</p> <p>3.5 create session</p> <p>3.6 destroy session</p> <p>3.7 Create a session when the user log in using the form of Practical 12. Provide an option to logout. Once the user logs out then he/she should not be able to open the home page using the URL.</p> <p>3.8 Create a php script which will store a cookie on the client's device to identify whether the user is a new one or a repeated one.</p> <p>3.9 Create a php script which will help the user to remember his/her username and password on the login form.</p> <p>3.10 Write a php script to store the details of a registration form into the users table of a database.</p>
<b>4</b>	<p>4.1 Database connection</p> <p>4.2 Create a MySQL Table Using MySQLi and PDO</p> <p>4.3 Insert Data Into MySQL Using MySQLi and PDO</p> <p>4.4 Demo of PHP MySQL Prepared Statements</p> <p>4.5 Select Data From a MySQL Database</p> <p>4.6 Delete Data From a MySQL Table Using MySQLi and PDO</p> <p>4.7 Update Data In a MySQL Table Using MySQLi and PDO</p> <p>4.8 Limit Data Selections From a MySQL Database</p> <p>4.9 Write a php script to authenticate the user using a login form where the user will provide a username and password. Find these username and password in the users table to see if the user is registered or not. If yes then take him to the home page otherwise give an error message.</p> <p>4.10 Write a php script to provide an edit profile page to the user where he/she can see the existing details and if he/she wants to change details then he/she can change them.</p> <p>4.11 Write a php script to list all the registered users in a table. Provide an option "Delete" with each row of the table so that if the user wants to delete an entry then he/she can.</p>
<b>5</b>	<p>5.1 Create web page with javascript to display alert message. (use variable)</p> <p>5.2 Create web page with javascript to prompt for some value at run time from user and display on page.</p> <p>5.3 Create web page with javascript to fetch any value at runtime and display whether it's odd or even.</p> <p>5.4 Create web page with javascript to fetch any name at runtime and display that names 10 times using suitable loop.</p> <p>5.5 Create web page with javascript to perform login authentication check process using UDF.</p>

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5.6	Create web page with javascript to store and retrieve any value using Cookie.
5.7	Create an HTML registration form along with validation to restrict user to submit blank input box.
5.8	Create an HTML registration form along with validation to check password strength (Show Live Status Of password Strength). If length is less than 6 then do not allow user to submit form.
5.9	Write a java script to redirect request based on button click.
5.10	Write a java script to pop up different types of alert/message/warning/information window on screen (on button click)
5.11	Write a simple javascript inside the PHP code to display alert box.
5.12	Write a java script to perform any arithmetic operation using Prompt. (Attach External JavaScript file)

**Requirement of Laboratory Support:**

Students need to install **Xampp,Sublime Text** tool using the following link :

<https://www.sublimetext.com/download>

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- **Sem.** :1
- **Subject Code** :05MC0103
- **Subject** : Object Oriented Programming using JAVA
- **Course Objectives:**
  1. To understand the fundamentals of Java Programming Language
  2. To implement the concepts of Object-Oriented Programming and learn interface
  3. To develop proficiency in java using the concepts of Package and Exception Handling
  4. To interpret the concepts of Generics, Collections and Lambda in Java
  5. To develop Java based Applications using the concepts of Multithreading and Files

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Knowledge of C, C++ Programming Language

Unit No	Topics Covered
<b>1</b>	<b>Basics of Java:</b> <ul style="list-style-type: none"> <li>• History of Java</li> <li>• Features of OOP</li> <li>• Java Buzzwords</li> <li>• Installing Java</li> <li>• Programming Structure of Java</li> <li>• Java data-types</li> <li>• Keywords and Identifiers</li> </ul>

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	<ul style="list-style-type: none"> <li>• Java Operators</li> <li>• Type Casting</li> <li>• Looping Control (for, while, do-while etc)</li> <li>• Control Statements (if, nested if, else-if ladder, switch etc)</li> <li>• Escape Sequences</li> <li>• Operator precedence in java</li> <li>• Arrays</li> <li>• Initializer block</li> <li>• Class-Initializer block</li> </ul>
<b>2</b>	<p><b>Class Fundamentals, Inheritance and Interface:</b></p> <ul style="list-style-type: none"> <li>• Defining class and methods</li> <li>• Working with class and methods</li> <li>• Members of Class</li> <li>• Method Overloading</li> <li>• Method Overriding</li> <li>• this keyword</li> <li>• Inheritance Basics</li> <li>• Types of Inheritance</li> <li>• Abstract Class</li> <li>• super keyword</li> <li>• Interface Basics</li> <li>• Use of Interface</li> <li>• final keyword</li> <li>• static keyword</li> </ul>
<b>3</b>	<p><b>Package and Exception Handling:</b></p> <ul style="list-style-type: none"> <li>• Access modifiers in java</li> <li>• Introduction to Packages</li> <li>• Built-In packages</li> <li>• User-Defined Packages</li> <li>• String Class</li> <li>• StringBuffer and StringBuilder</li> <li>• Wrapper Class</li> <li>• Exception Handling <ul style="list-style-type: none"> <li>○ Exception Hierarchy</li> <li>○ Use of try, catch and finally keywords</li> <li>○ Checked and Unchecked exceptions</li> <li>○ Use of throw and throws</li> <li>○ Custom Exceptions</li> </ul> </li> <li>• Nested classes in java</li> <li>• Use of varargs</li> <li>• Scanner class</li> </ul>
<b>4</b>	<p><b>Collection Framework, Generics and Lambda:</b></p> <ul style="list-style-type: none"> <li>• Introduction of Collection Framework</li> </ul>

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	<ul style="list-style-type: none"> <li>• Collection interface</li> <li>• List interface</li> <li>• Set interface</li> <li>• Map interface</li> <li>• ArrayList and LinkedList classes</li> <li>• List iterator interface</li> <li>• HashSet and TreeSet classes</li> <li>• Generics Fundamentals</li> <li>• Generics class</li> <li>• Generics methods</li> <li>• A Generic class with type parameters</li> <li>• Bounded types with Generics in java</li> <li>• Rules for Generic types</li> <li>• Introduction to Lambda Expression</li> <li>• Why Lambdas?</li> <li>• Syntax of Lambda Expression</li> <li>• Functional interfaces, method reference</li> <li>• Constructor reference, variable scope</li> <li>• Processing Lambda expression and inner classes</li> </ul>
<p><b>5</b></p>	<p><b>Files, Thread and Multithreading:</b></p> <ul style="list-style-type: none"> <li>• Introduction to Files</li> <li>• File Class</li> <li>• Byte Stream classes and Character Stream classes</li> <li>• Working with files</li> <li>• Paths</li> <li>• reading and writing files,</li> <li>• creating files and directories</li> <li>• copying, moving and deleting files</li> <li>• getting file information</li> <li>• Random Access File</li> <li>• Reading and writing files using Byte Streams</li> <li>• Reading and Writing files using Character Streams</li> <li>• Introduction to Thread</li> <li>• Thread Life-Cycle</li> <li>• Runnable Interface</li> <li>• Thread Class</li> <li>• Thread Priorities</li> <li>• Synchronization in thread</li> <li>• Daemon Thread</li> <li>• Multithreading concept with example</li> </ul>

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**Course Outcomes:**

1. Design console-based applications using basics of Java.
2. Demonstrate how to implement features of OOP and interface
3. Determine how to use Package and Exception Handling in Java
4. Develop a Java application using Generics, Collections and Lambda
5. Build their ability to develop java-based applications using Files and Multithreading concepts

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H	M		H			L	H		H
CO2					H			H		L	
CO3					H			H			M
CO4	H					L	M				H
CO5			H	H		H			M		

**Text Book:**

1. **Java: A Beginner’s Guide, Herbert Schildt, McGraw-Hill Education, Sixth Edition**
2. **Core Java, Volume I – Fundamentals, Cay S. Horstmann, Pearson Education, Seventh Edition**

**Reference Books:**

1. **The Complete Reference Java, Herbert Schildt, McGraw-Hill Education, Sixth Edition**
2. **Programming with Java, E Balagurusamy- McGraw-Hill, Fifth Edition**

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**3. Java Programming, Hari Mohan Pandey, Pearson Education, First Edition**

**Web References:**

1. <https://docs.oracle.com/en/java>
2. <https://www.tutorialspoint.com/java/index.htm>

**App References:**

1. **Learn Java Programming Tutorial**
2. **Java Programming**

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Text Book	Chapter Numbers
1	1	1,2,3,5
2	1	4,6,7,8
3	1	8,9
4	1	13,14
5	1	10,11

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**PRACTICALS**

<b>Unit No</b>	<b>List of Practicals</b>
<b>1</b>	1. Write a simple java program to display message. 2. Write a java program to get a name from user and display on screen. 3. Write a java program to get personal information from user and display on screen. . 4. Write a java program to perform different arithmetic operations. (Using Command Line args) 5. Write a java program to get different values from user at runtime using Scanner. 6. Write a java program to get the name from user and print 10 times using loop. 7. Write a java program to use IF Condition 8. Write a java program to find ODD or EVEN number using command line argument † 9. Write a java program to find out student's result/grade using IF condition. 10. Write a java program of 1D array
<b>2</b>	11. Write a java program to use interface in java 12. Write a java program to extend one interface into another interface 13. Write a java program to perform simple inheritance. 14. Write a java program to use multi-level inheritance. 15. Write a java program to use Hierarchical inheritance 16. Write a java program to use Abstract class 17. Write a java program to use interface 18. Write a java program to use Multiple inheritance using interface. 19. Write a java program to use method overriding 20. Write a java program to perform overriding of abstract class 21. Write a java program to demonstrate encapsulation
<b>3</b>	22. Write a java program to implement simple exception handling 23. Write a java program to implement ArithmeticException 24. Write a java program to use Finally block in Exception Handling 25. Write a java program to use Multiple Catch Block 26. Write a java program to use Throw Keyword 27. Write a java program to use Throws Keyword 28. Write a java program to implement custom exception 29. Write a java program to implement Exception Propagation 30. Write a java program to implement Exception Chaining 31. Write a java program to use simple inner class in your program 32. Write a java program to use Static Inner Class 33. Write a java program to use Local Inner Class 34. Write a java program to use Nested Interface 35. Write a java program to display date in different format 36. Write a java program to display different calendar information using calendar class 37. Write a java program to add, subtract days/month into current date and time 38. Write a java program to use GregorianCalendar to display calendar information

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<b>4</b>	<p>39. Write a java program to store multiple elements using an ArrayList</p> <p>40. Write a java program to add multiple elements into a LinkedList</p> <p>41. Write a java program to store multiple values in a Vector and fetch it using an Enumeration</p> <p>42. Write a java program to store multiple values in a Queue and perform different operations on it.</p> <p>43. Write a java program to add Book IDs and Book Names (Pairs) using a HashSet.</p> <p>44. Write a java program to demonstrate Priority Queue</p> <p>45. Write a java program to store different mapped values (Key-Value) using a TreeMap Class</p> <p>46. Write a java program to add multiple elements using a Sorted Set of collection</p> <p>47. Write a java program to add multiple elements and perform operations based on LIFO method using a Stack Class of collection interface.</p> <p>48. Write a java program to add different values in a pair (key-value) into a TreeMap and perform different operations on it.</p>
<b>5</b>	<p>49. Write a java program to write a simple message into a file using a FileOutputStream</p> <p>50. Write a java program to read a message (data) from a file by using a FileInputStream.</p> <p>51. Write a java program to write data into a file character wise by using a FileWriter class of IO</p> <p>52. Write a java program to read data character wise from a file by using a FileReader class.</p> <p>53. Write a java program to create a thread using Thread Class</p> <p>54. Write a java program to create a thread using Runnable class</p> <p>55. Write a java program to set Thread name and priority &amp; test it.</p> <p>56. Write a java program to create two threads and make them Synchronized (ThreadSafe)</p> <p>57. Write a java program to join two threads which perform loop operations.</p>

**Requirement of Laboratory Support:**

Students need to install **JDK** tool using the following link :

[https://www.java.com/download/ie\\_manual.jsp](https://www.java.com/download/ie_manual.jsp)

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- **Sem.** :1
- **Subject Code** :05MC0104
- **Subject** : Operating Systems
- **Course Objectives:**
  1. To understand the overall structure and components of operating system.
  2. To analyze the key concept of process management and concurrency problem.
  3. To understand the working of main memory and virtual memory.
  4. To understand various scheduling policies used by operating system.
  5. To understand the management of files and I/O devices.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Basic knowledge of computers.

Unit No	Topics Covered
<b>1</b>	<p><b>Introduction to Operating System:</b> Introduction, Importance of OS: Objectives and Functions, Evolution of OS, Major achievements</p> <p><b>Process and Threads</b> The concept of Process, Creation and Termination of Process, ProcessStates and Models, PCB, Process and Threads, Types of Threads, Process Vs. Threads</p> <p><b>CPU Scheduling</b> Types Of Scheduling , Different Scheduling Algorithms</p>
<b>2</b>	<p><b>Process Synchronization &amp; Deadlock</b> Key terms related to concurrency, Requirements of mutual exclusion, Semaphores, Producer-Consumer problem, Readers-Writers problem</p>

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	<p><b>Deadlock:</b> Principles Of Deadlock, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Dining philosophers problem: Solution using semaphores</p>
<b>3</b>	<p><b>Memory Management &amp; Virtual Memory:</b> <b>Memory Management:</b> Requirements of memory management, Memory Partitioning, Simple Paging and Simple segmentation <b>Virtual Memory:</b> Hardware and Control Structures: Need of virtual memory, Virtual Memory paging, Virtual memory segmentation, Address translation in paging, Address translation in segmentation, Operating System Software : Replacement Policy</p>
<b>4</b>	<p><b>Input/ Output and Files</b> I/O Management and Disk Scheduling: I/O Devices, Organization of I/O function, I/O buffering, Disk Scheduling, RAID <b>File Management:</b> Overview, File organization and access, File directories, File sharing, Record blocking, secondary storage management</p>
<b>5</b>	<p><b>Computer Security Threats</b> Computer Security Concepts, Threats, Attacks, Assets, Intruders</p>

**Course Outcomes:**

1. Students will be able to demonstrate understanding of the concepts, structure and design of operating Systems
2. Students will be able to demonstrate understanding of operating system design and its impact on application system design and performance
3. Students will be able to apply different solutions for Memory Partitioning
4. Students will be able to understand about interactions between user application, hardware and OS
5. Students will be able to design program in Unix for file and directory management

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Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	M		H					H		
CO2	H	H	M					H			
CO3	H	L		H							M
CO4			H	H					H		
CO5		H	H	M							H

**Text Book :**

“Operating Systems”, Stalling W, Prentice Hall India, 7th edition

**Reference Books :**

1. “Operating System Principles”, Silberschatz A., Peter B. Galvin and Greg Gagne, Wiley-Indian, 8<sup>TH</sup> edition.
2. “Modern Operating Systems”, Tanenbaum A.S., PHI, 4th Edition
3. “Understanding Operating Systems”, Flynn I.M, Cengage India Publication
4. “The Design of UNIX Operating System”, Bach M J , Prentice Hall India, 1993.
5. “Unix Shell Programming ”, Yashvant Kanetkar , BPB Publications , 1<sup>st</sup> edition.
6. “Unix Concepts and Applications ”, Sumitabha Das , McGraw-Hill Publications, 4<sup>th</sup> edition.

**FACULTY OF COMPUTER APPLICATIONS**  
**Master of Computer Applications****Web References :**

1. <https://www.javatpoint.com/os-tutorial>
2. <https://www.geeksforgeeks.org/operating-systems/>

**App References :**

1. Operating System Tutorials
2. AnLinux : Run Linux on Android
3. Linux Tutorial

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	2-2.1 ,2.2, 2.3 3-3.1,3.2 4-4.1 , 4.2 9-9.1 , 9.2
2	5 – 5.1, 5.3, 5.6 6 – 6.1, 6.2, 6.3 , 6.4 , 6.6
3	7-7.1,7.2,7.3,7.4 8 – 8.1 , 8.2
4	11-11.1,11.2,11.4,11.5,11.6 12-12.1,12.2,12.3,12.4,12.5,12.6
5	14 – 14.1, 14.2 , 14.3



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**PRACTICALS**

Sr. No.	List of Practical
<b>UNIT-1</b>	
<b>1</b>	Check the output of following commands: oDate, ls, who, cal, ps, wc, cat, uname, pwd, mkdir, rmdir, cd, cp, rm, mv, chmod,
<b>2</b>	Check the output of following filter commands: diff, grep, sed, head, tail, cut, paste, sort, find
<b>3</b>	Write shell script to accept numbers and perform addition, subtraction, multiplication and division
<b>4</b>	Write shell script to accept the string and check whether the string is palindrome or not.
<b>5</b>	Write shell script to accept the number and check whether the no. is odd or even. Find length of no. and sum of digits in the number.
<b>6</b>	Write shell script to accept the string and replace it by another string.
<b>7</b>	Accept the filename and display the last modification time if file exists, otherwise display appropriate message.
<b>8</b>	Fetch the data from file and display data into another file in reverse order.
<b>9</b>	Write a script to delete zero sized files from a given directory (and all its sub-directories).
<b>10</b>	Write a shell script print all the prime numbers from 1 to 300. (Use nested loops, break and continue)
<b>UNIT - 2</b>	
<b>11</b>	Write a script that lists files by modification time when called with 1m and by access time when called with 1a. By default the script should show the listing of all the files in current directory.
<b>12</b>	Write a script that behaves both in interactive and noninteractive mode. When no arguments are supplied, it picks up each C program from the current directory and lists the first 10 lines. It then prompts for deletion of a file. If the user supplies arguments with the script then it works on those files only.
<b>13</b>	Display the processes in the system every 30 seconds five times using a (i) while loop, (ii) for loop.
<b>14</b>	Write a script which looks up every .c file in the current directory for the strings printf or fprintf. If found, the script adds the statement #include <stdio.h> at the beginning of

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	the file.
<b>15</b>	Write a script that uses find to look for a file and echo a suitable message if the file is not found.
<b>16</b>	Write a script for generating a mark sheet after reading data from a file. File contains student roll no, name , marks of three subjects.
<b>17</b>	The distance between two cities (in k.m.) is input through the keyboard. Write a shell script to convert and print the distance in meters, feet, inches and centimeters.
<b>18</b>	Write a script to display all words of a file in ascending order and to display the last modified file.
<b>19</b>	Ramesh's basic salary is input through the keyboard. His DA is 40% of basic salary, and HRA is 20% of basic salary. Write a script to calculate his gross salary.
<b>20</b>	The length and Breadth of a rectangle and radius of a circle are input through the keyboard. Write a shell script to calculate area of rectangle and circumference of the circle.
<b>UNIT-3</b>	
<b>21</b>	Write a script to make following file and directory management operations menu based: oDisplay current directory oList directory oMake directory oChange directory oCopy a file oRename a file oDelete a file  oEdit a file
<b>22</b>	Write a script which reads a text file and output the following: oCount of character, words and lines. oFile in reverse. oFrequency of particular word in the file. oLower case letter in place of upper case letter.
<b>23</b>	Write a shell script to check whether the named user is currently logged in or not.
<b>24</b>	Write a Script for Simple Database Management System Operation. Database File Contains Following fields. EMP_NO, EMP_NAME, EMP_ADDRESS, EMP_AGE, EMP_GENDER EMP_DESIGNATION EMP_BASIC_SALARY Provide Menu Driven Facility For oVIEW RECORDS  oADD RECORD

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	<ul style="list-style-type: none"> <li>oDELETE RECORD</li> <li>oMODIFY RECORD.</li> <li>oCOUNT TOTAL NUMBER OF RECORDS</li> <li>oEXIT</li> </ul>
<b>25</b>	<p>Write shell script for simple library management system. Database with fields: Accno, Title, Author, Edition, Publisher</p> <ul style="list-style-type: none"> <li>oView records based on query</li> <li>oAdd record</li> <li>oDelete record</li> <li>oCount total no. of records</li> <li>oExit</li> </ul>
<b>26</b>	Accept filename and displays the permission of that file if file exists otherwise print message
<b>27</b>	Write a script to display the date, time and a welcome message (like Good Morning should be displayed with 24 hours notation)
<b>28</b>	Write a script to display the name of those files (in the given directory) which are having multiple links.
<b>29</b>	Write a script to display the name of all executable files in the given directory.
<b>30</b>	Write a script to display the last modified file.
<b>UNIT -4</b>	
<b>31</b>	Write a Shell Script to take user data as command line argument and display a greetings message
<b>32</b>	Write a script that deletes all leading and trailing spaces in all lines in a file. Also remove blank lines from a file.
<b>33</b>	<p>Write Menu driven program for</p> <ul style="list-style-type: none"> <li>oDisplay all the words of file in ascending order.</li> <li>oRemove all space from file –</li> <li>oDisplay zero size files</li> </ul> <p>Perform Find and replace operation</p>

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<b>34</b>	<p>Write a Script for Simple Database Management System Operation. Database File Contains Following fields. EMP_NO, EMP_NAME, EMP_ADDRESS, EMP_AGE, EMP_GENDER EMP_DESIGNATION EMP_BASIC_SALARY Provide Menu Driven Facility For</p> <ul style="list-style-type: none"> <li>oVIEW RECORD</li> <li>oADD RECORD</li> <li>oDELETE RECORD -</li> <li>oMODIFY RECORD. -</li> <li>oCOUNT TOTAL NUMBER OF RECORDS</li> <li>oEXIT</li> </ul>
<b>35</b>	<p>Write a shell script which will receive either the filename or the filename with its full path during execution. This script should obtain information about this file as given by ls -l and display it in proper format.</p>
<b>36</b>	<p>Write a shell script which receives year from the keyboard and determines whether the year is leap year or not. If no argument is supplied the current year should be assumed.</p>
<b>37</b>	<p>Write shell script for simple library management system. Database with fields: Accno, Title, Author, Edition, Publisher</p> <ul style="list-style-type: none"> <li>oView records</li> <li>oAddrecord -</li> <li>oDelete record</li> <li>oCount total no. of records -</li> <li>oExit</li> </ul>
<b>38</b>	<p>If Cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss. Also determine how much profit was made or loss incurred.</p>
<b>39</b>	<p>Write a shell script which deletes all lines containing the word unix in the files supplied as arguments to this shell script.</p>

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<b>40</b>	Write a shell script which displays a list of all the files in the current directory to which you have read , write and execute permissions.
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**Requirement of Laboratory Support:**

Students need to install Ubuntu OS for the practical practice.

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- **Sem.** : 1
- **Subject Code** : 05MC0105
- **Subject** : Relational Database Management Systems
- **Course Objectives** :
  1. To be able to understand the fundamentals of SQL.
  2. To depict a database system using E-R diagram and to be able to carry out for normalization process.
  3. To get familiarize with concepts of transaction processing and database security.
  4. To implement and execute SQL Queries.
  5. To write and execute PL/SQL scripts.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	40	30

- **Prerequisites:**
  1. Basics and elementary knowledge of working with the computer.

Unit No	Topics Covered
<b>1</b>	<b>Fundamentals of DBMS:</b> Overview of Database Management systems, RDBMS, DBMS vs RDBMS, Characteristics of Database, Benefits of DBMS, Applications of DBMS, Database Users (Actors & Workers), Schema vs Instance, Data Independence, Brief overview of Database Models, Database System Architecture.
<b>2</b>	<b>Database Design:</b>

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	<p>The Entity Relationship Model: The basics of E-R Model, Components of E-R Diagram, Entity, Attribute and Relationships, Mapping Cardinality, Binary and Ternary relationship, E-R Diagram Notations, The concept of weak entity set, E-R diagram illustrations. Extended E-R features – specialization &amp; generalization.</p> <p>Normalization Process: Overview of functional dependency, types of functional dependencies, decomposition process for a relation, Normalization – 1NF, 2NF and 3NF.</p>
<b>3</b>	<p><b>Transaction Processing and Database Security:</b> Transaction Processing Concepts: Overview of Transaction Processing, Transaction States with State Transition Diagram, ACID properties.</p> <p>Security Mechanism: Introduction, Discretionary Access Control (DAC), Mandatory Access Control (MAC), Public Key Encryption.</p>
<b>4</b>	<p><b>SQL Essentials:</b> Overview of SQL, Categories of SQL Commands: DDL(Create, Alter, Truncate, Drop, Rename), DML (Insert, Update, Delete), DCL (Grant, Revoke), TCL (Commit, Rollback, Savepoint), DQL(Select), Constraints (Unique, Not Null, Primary Key, Foreign Key, Check, Default), SQL Operators, Group By and Having, Order By, Types of Joins, Built-in Functions.</p>
<b>5</b>	<p><b>PL/SQL Objects:</b> Fundamentals of PL/SQL, PL/SQL block structure, Stored Functions and Procedures, Triggers.</p>

**Course Outcomes:**

1. Student will be able to understand the various fundamental concept of SQL.
2. Student will be able to represent database design through E-R diagram and will be able to perform normalization process.

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3. Student will be able to conceptualize the concepts of transaction processing and database security.
4. Student will be able to implement and execute SQL Queries.
5. Students will develop an ability to write and execute PL/SQL scripts.

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		L		M		L		M	L		H
CO2	L		H				M			M	
CO3		H		L		M	L		H		L
CO4	L		M		M			H			L
CO5		M		H		M			H		

**Text Book:**

1. "Fundamentals of Database Systems", Ramez Elmsari, Shamkant B Navathe, Pearson Education, 4th Edition.
2. "SQL, PL/SQL the programming Language of Oracle", Ivan Byross, BPB Publication, 4th Edition.

**Reference Books:**

1. "Database System Concepts", Silberschatz, Korth, Sudarshan, McGraw Hill Publication, 4th Edition.
2. "Database Systems Concepts, Design & Applications", S. K. Singh, Pearson Education.
3. "SQL and PL/SQL for Oracle 11g" Black Book, P.S.Deshpande, Dreamtech Publication.
4. "Oracle Database 11g: The Complete Reference", Kevin Loney, Oracle Press.

**Web References:**

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1. <https://www.oracletutorial.com/>
2. <https://www.guru99.com/sql.html>
3. <https://www.plsqltutorial.com/>
4. <https://www.guru99.com/pl-sql-tutorials.html>
5. <https://www.tutorialspoint.com/plsql/index.htm>

**App References:**

1. [https://play.google.com/store/apps/details?id=in.ajaykhatri.learnbms&hl=en\\_IN](https://play.google.com/store/apps/details?id=in.ajaykhatri.learnbms&hl=en_IN)
2. [https://play.google.com/store/apps/details?id=com.msh.plsqllearning&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.msh.plsqllearning&hl=en_IN&gl=US)
3. <https://www.oracle.com/database/technologies/appdev/plsql.html>
4. <https://livesql.oracle.com/apex/>
5. <https://apex.oracle.com/en/>

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book - 1: Chapter 1: (1.1 to 1.6), Chapter 2: (2.1 to 2.2)
2	Book - 1: Chapter 3, Chapter 4: (4.1 to 4.2), Chapter 10(10.2 to 10.5)
3	Book - 1: Chapter 17 (17.1 to 17.3), Chapter 23: (23.1 to 23.3, 23.6)
4	Book - 2: Chapter 7, 8, 9, 10
5	Book - 2: Chapter 15, 18

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**PRACTICALS**

Sr.No	Unit : 1																									
<b>1</b>	Identify and define structure of at least 3 tables of student related information with attributes, data type ,size and constraints.																									
<b>2</b>	Identify and define structure of at least 3 tables of Employee related information with attributes, data type ,size and constraints.																									
Unit : 2																										
<b>1</b>	Design ER diagram of Students database (As per above question: 1) with appropriate relationship.																									
<b>2</b>	Design ER diagram of Employee database (As per above question: 2) with appropriate relationship.																									
Unit : 3																										
<b>1</b>	Insert appropriate records in student database tables with verification of various constraints. Also perform record updation process.																									
<b>2</b>	Insert appropriate records in Employee database tables with verification of various constraints. Also perform record updation process.																									
Unit : 4																										
<b>1</b>	<table border="1"> <thead> <tr> <th align="center">Person_Id</th> <th align="center">Fname</th> <th align="center">Lname</th> <th align="center">City</th> <th align="center">Salary</th> </tr> </thead> <tbody> <tr> <td align="center">1</td> <td>Sneha</td> <td>Sheth</td> <td>Rajkot</td> <td align="center">10000</td> </tr> <tr> <td align="center">2</td> <td>Puja</td> <td>Parmar</td> <td>Ahmedabad</td> <td align="center">2000</td> </tr> <tr> <td align="center">3</td> <td>Riya</td> <td>Gajar</td> <td>Pune</td> <td align="center">8000</td> </tr> <tr> <td align="center">4</td> <td>Sandip</td> <td>Jadeja</td> <td>Pune</td> <td align="center">5000</td> </tr> </tbody> </table>	Person_Id	Fname	Lname	City	Salary	1	Sneha	Sheth	Rajkot	10000	2	Puja	Parmar	Ahmedabad	2000	3	Riya	Gajar	Pune	8000	4	Sandip	Jadeja	Pune	5000
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4	Sandip	Jadeja	Pune	5000																						

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	<table border="1"> <tr> <td>5</td> <td>Alpesh</td> <td>Prajapati</td> <td>Mumbai</td> <td>20000</td> </tr> </table>	5	Alpesh	Prajapati	Mumbai	20000																																					
5	Alpesh	Prajapati	Mumbai	20000																																							
	<ol style="list-style-type: none"> <li>1. Create above Table name as Person.</li> <li>2. Insert data shown in table.</li> <li>3. Select information about Person_Id, Fname of the person.</li> <li>4. Display the list of person.</li> <li>5. Sort the person by salary.</li> <li>6. Display city from table with distinct values.</li> <li>7. Change the city of sandip from pune to kolkata.</li> <li>8. Display person whose Lname is "Prajapati".</li> <li>9. Add new columns state, Birthdate and pincode into table.</li> <li>10. Display all information of person having salary more than 6000.</li> <li>11. Delete the person having salary less than 3000.</li> <li>12. Rename table from person to person_master.</li> </ol>																																										
<p align="center"><b>2</b></p>	<table border="1"> <thead> <tr> <th>Cust_no</th> <th>Cust_name</th> <th>Address1</th> <th>Address2</th> <th>City</th> <th>State</th> <th>Ph_no</th> </tr> </thead> <tbody> <tr> <td>C1</td> <td>Priya</td> <td>Ring Road</td> <td>Puja Park</td> <td>Ahmedabad</td> <td>Gujarat</td> <td>8989878548</td> </tr> <tr> <td>C2</td> <td>Puja</td> <td>Lajpat Nager</td> <td>Shyamal Colony</td> <td>Banaras</td> <td>UP</td> <td>7898456213</td> </tr> <tr> <td>C3</td> <td>Ankit</td> <td>Borivali</td> <td>Panchayat Nager</td> <td>Mumbai</td> <td>Maharashtra</td> <td>7885984251</td> </tr> <tr> <td>C4</td> <td>Ravi</td> <td>Vajdi Road</td> <td>Nandbhoomi Colony</td> <td>Delhi</td> <td>Delhi</td> <td>7898452034</td> </tr> <tr> <td>C5</td> <td>Alpa</td> <td>Jamanager Road</td> <td>Railway colony</td> <td>Ahmedabad</td> <td>Gujarat</td> <td>7465241589</td> </tr> </tbody> </table> <ol style="list-style-type: none"> <li>1. Create above Table name as Cust_master.</li> <li>2. Insert Data shown in table.</li> <li>3. Select information about all customers.</li> <li>4. Display the list of customers belonging to "Gujarat" state.</li> <li>5. Sort the customer by their customer name.</li> <li>6. Display city from table with distinct values.</li> <li>7. Change the address1 of priya from "Ring Road" to "CG Road".</li> <li>8. Display city of customer whose state is Gujarat.</li> <li>9. Add new column pin_code into cust_master table.</li> <li>10. Drop column pin_code from table.</li> <li>11. Delete the customer having ph_no value '7898452034'.</li> <li>12. Rename table from cust_master to customer_detail.</li> </ol>	Cust_no	Cust_name	Address1	Address2	City	State	Ph_no	C1	Priya	Ring Road	Puja Park	Ahmedabad	Gujarat	8989878548	C2	Puja	Lajpat Nager	Shyamal Colony	Banaras	UP	7898456213	C3	Ankit	Borivali	Panchayat Nager	Mumbai	Maharashtra	7885984251	C4	Ravi	Vajdi Road	Nandbhoomi Colony	Delhi	Delhi	7898452034	C5	Alpa	Jamanager Road	Railway colony	Ahmedabad	Gujarat	7465241589
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<p align="center"><b>3</b></p>																																											

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Id	Name	Type	Price	Quality	Item_pack_date
I1	Dairymilk	Chocolate	500	Good	12-aug-2000
I2	Kajukatri	Mithai	1000	Verygood	15-jan-2016
I3	Pizza	Fastfood	350	Average	20-Feb-2015
I4	Orange juice	Juice	50	Best	05-feb-2016
I5	Vanilla_cack	Bakery Item	2000	Good	01-jan-2016

1. Create above Table name as item\_master.
2. Insert Data shown in table.
3. Select information about price,quality and item\_pack\_date of the item.
4. Display information about item.
5. Sort the item by its quality.
6. Display quality from table with distinct values.
7. Change the quality of item from Good to Verygood.
8. Display item having quality Verygood.
9. Add new columns item\_pur\_date into table.
10. Display all information of items having price more than Rs. 500.
11. Delete the item having price of Rs. 50.
12. Rename table from person to Item\_detail.

**4**

1. Create the following table named table as CUSTOMER:

COLUMN NAME	DATATYPES	SIZE	DESCRIPTON
CUST_NO	NUMBER	4	PRIMARY KEY
FIRST_NAME	VARCHAR2	20	NOT NULL
LAST_NAME	VARCHAR2	20	-
ADDRESS	VARCHAR2	20	-
CITY	VARCHAR2	8	-
STATE	VARCHAR2	20	-
PIN	NUMBER	6	-
B_DATE	DATE	-	-
STATUS	CHAR	1	VALUES MUST BE IN ('V','I','A') – Check Constraint

2. Insert the following data into the CUSTOMER table:

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1003	RAJ	BAHADUR	SHANTI VILLA	UDP	KARNATAKA	576101	1-AUG-70	V
1004	FELIX	SIMON	M-J-56	PJM	GOA	403002	12-FEB-71	A
1005	RAJAN	KUTTY	A1 TRADERS	KNR	KERALA	670001	09-JUN-71	A
1006	SHILPA	PAI	12/4B	MNG	KARNATAKA	574154	11-DEC-70	I
1007	BOSCO	RAKSHIT	R.K. PLAZA	BNG	KARNATAKA	576201	01-JAN-71	A

3. Display all the records from the table.
4. Display all the records from the table where state is KARNATAKA.
5. Delete the row from the table where PIN CODE is 576201.
6. Set the PIN CODE equal 476001 where CUST\_NO=1004.
7. Change the ADDRESS as "KAVI MUDDANNA MARG" AND PIN=576104 where CUST\_NO=1003.
8. Delete the records of GOA state from the table and then retrieve all the records back.
9. List all the records for INVALID ('I') persons.
10. Select all the records with single occurrence (without duplication) of state from the table.
11. Sort and display the customer data, in the alphabetic order of state.
12. Sort and display the state field in the in descending order.
13. Select the records of KARNATAKA customers who are valid ('V').
14. Retrieve records of Karnataka / Kerala customers.
15. Retrieve records of Karnataka / Kerala customers who are ACTIVE ('A').
16. Retrieve records of Karnataka customers with pin code 576201.
17. Display all the rows from the table except for customer number 1005.
18. Retrieve rows where the state name begins with K and following by any other character.
19. Retrieve rows where name contains the word RAJ embedded it.
20. Display all the row who's CUST\_NO is in the range from 1003 to 1005.
21. Display all the rows whose dates are in the range of 10-JAN-71 and 31-DEC-71.
22. Retrieve all the rows where city column equals to UDP or MNG or BNG or PGN.
23. Rename customer table to CUST.

**Unit : 5**

<b>1</b>	Write a program to calculate the AREA of a circle and store that value in the table. C_AREA (RADIUS NUMBER (5), AREA NUMBER (14,2)).
<b>2</b>	Write a program to calculate the square and cube of the given number. Write a program that accepts a value from the user then print that value with and without using third variable.
<b>3</b>	Write a program of mark sheet with displays the SEAT_NO, NAME OF STUDENT, marks of 5 subjects, total of 5 subjects and percentage, also display the class of student based on the value of percentage.
<b>4</b>	Write a program that prints value 1 to 100 numbers using FOR LOOP. Write a program that prints value 1 to 100 number using LOOP Command.

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	Write a program that prints value 1 to 100 number using WHILE LOOP Command.
<b>5</b>	Write a program that displays the use of %TYPE variable. This program stores the values of the columns in the memory variables using %TYPE and %ROWTYPE variables.
<b>6</b>	Write a simple procedure without any parameter that updates the values in the EMP table.
<b>7</b>	Write a simple procedure that increases by the salary of employees for the given department no by percentage inputted by the user using IN parameter.
<b>8</b>	Write a procedure that search's whether the given employee number is present or not in the table. (Use both IN and OUT mode variables) and also Write a PL/SQL block to call the SEARCH_EMP procedure.
<b>9</b>	Write a function that returns the square of the given number. Execute this function using separate PL/SQL block and also without using PL/SQL block on command line.
<b>10</b>	Write a function that returns balance for given account number.
<b>11</b>	Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is deleted from EMP table.
<b>12</b>	Write a trigger to insert the existing values of the EMP table into NEWEMP table when the record is updated in EMP table.
<b>13</b>	Write a trigger to insert the values into the NEWEMP table when the records are inserted into the EMP table.
<b>14</b>	Write a trigger that restricts the entry of record if salary is greater than Rs.50000.
<b>15</b>	Write a trigger that identifies the gender of the employee and according to the gender sets MR. in front of MALE employees and MS. in front of FEMALE employee.
<b>16</b>	Write a trigger to restrict user form using the table on Sunday.

**Requirement of Laboratory Support:**

Students need to install **SQL Plus** tool using the following link :

<https://www.oracle.com/in/database/technologies/oracle-database-software-downloads.html>



**Marwadi**  
University  
Marwadi Chandarana Group



# **Faculty of Computer Applications**

**Master of Computer Applications**

**MCA Sem - 2**

**Teaching Scheme**

**&**

**Syllabus**

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**MCA SEMESTER - 2**

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0201	COMPUTER NETWORKS	5	15	30	25	25	55	30	40	30
05MC0202	PYTHON PROGRAMMING	5	15	30	25	25	55	30	40	30
05MC0203	MOBILE PROGRAMMING	5	15	30	25	25	55	30	40	30
05MC0204	Mini Project – 1	2	6	12	10	10	22	NA	NA	100
05MC0205	Electives - 1	4	12	24	20	20	44	30	NA	70
05MC0206	NoSQL DATABASES									
05MC0207	IMAGE PROCESSING									
05MC0208	DATA ANALYTICS AND VISUALIZATION C#.NET									
05MC0209	MOOC - Node / Angular / Express / React JS	2	6	12	10	10	22	0	0	0
05SSL0205	COMMUNICATION SKILLS	1	3	6	5	5	11	30	NA	70
<b>Total</b>		<b>24</b>	<b>72</b>	<b>144</b>	<b>120</b>	<b>120</b>	<b>264</b>	<b>150</b>	<b>120</b>	<b>330</b>

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- **Sem.** :2
- **Subject Code** : 05MC0201
- **Subject** : Computer Networks
- **Course Objectives** :
  1. To equip the students with basics concept of Computer Networks.
  2. To familiarize the students with the standard models for the layered approach OSI and TCP/IP to communication between machines in a network and the protocols of the various layers.
  3. To gain basic insight of programming for network solutions.
  4. To understand deeply the work of each layer of TCP/IP model
  5. To analyze network through networking commands.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites**  
Basic Concept of Data Structures, Operating systems, Programming Language and Knowledge of Linux OS.

Unit No	Topics Covered
<b>1</b>	<b>Introduction:</b> Personal Area Network, Local Area Networks, Metropolitan Area Networks, Wide Area Networks, Internetworks, Network software, protocol hierarchies, Design issues for the layers, connection oriented vs. Connectionless service, service primitives, relationship of services in protocols, Reference Models, Open System Interconnection (OSI), TCP/IP Reference models, Example Networks: ARPANET, Architecture of Internet.
<b>2</b>	<b>Physical Layer &amp; Data Link Layer:</b>

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	Introduction to physical layer, Guided Transmission Media, Wireless Transmission, Data Link layer design issues, Error Correction and Detection , Elementary Data link protocols
<b>3</b>	<b>Medium Access Control Sublayer , Network Layer</b> The channel allocation Problem , Multiple access protocols, Ethernet , Network Layer design issues, Routing Algorithms, Congestion Control Algorithm,
<b>4</b>	<b>Transport Layer and Application Layer</b> Transport Services, Elements of Transport Protocols, UDP and TCP protocols ,Domain name system, Electronic Mail; the World Wide Web, HTTP
<b>5</b>	<b>Network Security:</b> Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Cryptography, Cryptology, Cryptanalysis, Steganography, Substitution Techniques, Transposition Techniques.

**Course Outcomes :**

1. Student will be able to explain basics of Computer Networks and functionality of each layer of OSI and TCP/IP models
2. Student will be able to compare difference between OSI and TCP/IP model
3. Student will be able to apply error-detection and error-correction techniques to provide better security
4. Student will be able to apply insight of programming for network solutions
5. Student will be able to evaluate OSI and TCP/IP layer

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H	-	-	H	-	-	-	-	-	H
CO2	H	-	M	-		-	-	-	-	-	L
CO3	H	H	H	-	H	-	-	-	-	-	M
CO4	H	H	H	-	H	-	-	-	-	-	H
CO5	H	H	-	-	M	-	H	H	-	-	M

**Text Book :**

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1. "Computer Networks", Andrew S Tanenbaum, David. J. Wetherall, Pearson Education, 5th Edition
2. "Cryptography and Network Security – Principles and Practice", William Stallings, Pearson Education, 5<sup>th</sup> Edition.

**Reference Books:**

- 1) "Computer Networks", Bhushan H Trivedi, Oxford University Press, 1<sup>st</sup> edition.
- 2) "Data Communications and Networking", Behrouz A. Forouzan, Tata McGraw-Hill, Fourth Edition
- 3) "Computer Networking- A Top-Down approach", Kurose and Ross, Pearson, 5th edition
- 4) "Computer Networks: A Systems Approach", Larry L. Peterson, Bruce S. Davie, Morgan Kaufmann Publishers, Fifth Edition, 2011.
- 5) "Computer Networking and the Internet", Fred Halsall, Addison Wesley, 5th edition
- 6) "Computer Networks: An Open Source Approach" ,Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, Mc Graw Hill Publisher, 2011

**Web References:**

<https://www.geeksforgeeks.org/computer-network-tutorials/>  
<https://www.practicalnetworking.net/classes/network-fundamentals/>

**App References:**

1. Networking Concepts and Configuration
2. Computer Networks

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Text book -1 , Chapter 1: 2,3,4.1 to 4.4,5.1
2	Text book -1,Chapter 2: 2.2, 2.3 Text book -1 , Chapter 3: 3.1 , 3.2 , 3.3
3	Text book -1,Chapter 4: 4.1,4.2,4.3,4.4 Text book -1 , Chapter 5 : 5.1, 5.2, 5.3
4	Text book -1,Chapter 6: 6.1, 6.2, 6.4,6.5 Text book -1 , Chapter 7 : 7.1 , 7.2 , 7.3
5	Text book -2, Chapter 1: 1.1 to 1.6 and Chapter 2: 2.2 and 2.3

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**PRACTICALS**

Sr. No.	List of Practicals
<b>UNIT-1</b>	
<b>1</b>	<p><b>Objective:</b> To make the students aware about the IT/Network infrastructure of their parent institute. Introduction to the lab infrastructure, the cabling/cable type and specifications/switch/topology/router/network infrastructure, Internet Connectivity, Wi-fi Connectivity of your department (labs and lecture halls) and how it is connected with the overall institute level IT infrastructure, How the institute obtains Internet Connectivity from its ISP, The Bandwidth and other specifications, Visit to the Computer Center of the Institute, Introduction to various Enterprise Servers/Servers of Licensed Software, Server hardware configuration, Server Management Tools, Enterprise Level Firewall, etc. So, lab 1 is intended as an in-campus IT infrastructure industrial visit for students. Students are supposed to prepare a report of this visit. Students are also supposed to note down the model/make of various network interface devices (NIC card, switch, router) used in their lab/department/institute, download their technical specifications from their respective web-site and attach those specifications in the report. The significance and interpretation of these specifications may be discussed by the faculty member during the corresponding lab/lecture hours pertaining to that particular device.</p>
<b>2</b>	<p><b>Objective:</b> To make the students aware about and learn the detailed use of the following OS level TCP/IP diagnostic and troubleshooting commands: ping, ns lookup</p>
<b>3</b>	<p><b>Objective:</b> To make the students aware about and learn the detailed use of the following OS level TCP/IP diagnostic and troubleshooting commands: ipconfig, arp, netstat, tracert, telnet</p>
<b>UNIT-2</b>	
<b>4</b>	<p><b>Objective:</b> Implement a simple TCP socket based client server program in Python in which the client connects to the server. The server displays the ipaddress and port number of client and sends an acknowledgement message back to client. The client displays the received acknowledgement message on screen.</p>

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<b>5</b>	<b>Objective:</b> Implement a simple UDP socket based client server program in Python in which the client connects to the server. The server displays the ip address and port number of client and sends an acknowledgement message back to client. The client displays the received acknowledgement message on screen.
<b>6</b>	<b>Objective:</b> Wireshark Installation, understanding the Wireshark Environment / Menu System, to start and stop live capture of traffic from given wired Ethernet network interface, capturing options, store captured data in different supported file formats, to open already stored captured data file.
<b>UNIT-3</b>	
<b>7</b>	<b>Objective:</b> Learn and use view level filters and capture level filters in Wireshark for different traffic types like Ethernet, ARP, IP, TCP, UDP, DNS, HTTP, etc. For each captured category, observe how different headers are encapsulated within each other. Eg. TCP encapsulated within IP, HTTP encapsulated within TCP, etc.
<b>8</b>	<b>Objective:</b> Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: Ethernet and ARP
<b>9</b>	<b>Objective:</b> Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: IP and ICMP
<b>10</b>	<b>Objective:</b> Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: TCP and UDP
<b>UNIT-4</b>	
<b>11</b>	<b>Objective:</b> Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: HTTP and DNS
<b>12</b>	<b>Objective:</b> Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: FTP, SMTP and Telnet
<b>13</b>	<b>Objective:</b> Capture the following traffic types and Interpret/ Analyze the corresponding header and payload: Ethernet and ARP
<b>UNIT-5</b>	

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<b>14</b>	Write a program that contains a string with a value "Hello World". The program should XOR each character in this string with 0 and displays the result.
<b>15</b>	Write program to implement Caesar cipher.
<b>16</b>	Write a program to implement 2x2 Hill cipher
<b>17</b>	Write a program to implement Playfair cipher
<b>18</b>	Write a program to implement Rail fence cipher

**References:**

- 1) <https://technet.microsoft.com/en-us/library/bb727023.aspx>
- 2) <https://docs.python.org/2/howto/sockets.html>
- 3) <https://www.aircrack-ng.org/>
- 4) <https://www.kismetwireless.net/>

**Requirement of Laboratory Support:**

Students need to install **Wireshark** tool using the following link :

<https://www.wireshark.org/download.html>

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- **Sem.** :2
- **Subject Code** : 05MC0202
- **Subject** : Python Programming
- **Course Objectives** :
  1. To develop basic applications using Python language
  2. To understand basic data structure of Python and apply the same to solve various types of problems.
  3. To understand the concepts of Object-oriented programming features of Python.
  4. To learn basics of Data Analysis
  5. To implement Database Connectivity features using Python

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Knowledge of any programming language

Unit No	Topics Covered
<b>1</b>	<b>Basics of Python</b> <b>Python Basics</b> <ul style="list-style-type: none"> <li>- Features, Installation, Basic Input Output statements, data type / objects, expressions, assignment, operators in Python, using IDLE</li> <li>- Condition checking using various types of ifs</li> <li>- Various types of loops using for and while</li> <li>- break, continue and pass</li> </ul> <b>Mutable and Immutable Objects in Python</b> <ul style="list-style-type: none"> <li>- List</li> <li>- Tuple</li> <li>- Dictionary</li> <li>- Set</li> </ul>

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	<p><b>Functions in Python</b></p> <ul style="list-style-type: none"> <li>- Defining and using function with returning values</li> <li>- Different types of arguments (Required arguments, Variable length Arguments and Keyword Arguments)</li> <li>- local, global and nonlocal variables</li> <li>- Anonymous / Lambda functions</li> <li>- Using map(), filter() and reduce() with functions</li> </ul>
<b>2</b>	<p><b>Exception Handling, Modules and File Handling</b></p> <p><b>Exception Handling</b></p> <ul style="list-style-type: none"> <li>- Different types of exception in Python</li> <li>- Exception handling blocks (try, except, else and finally)</li> <li>- Defining and raising exceptions</li> <li>- Assertion (assert) statement</li> <li>- Identifying types of errors and logging them</li> </ul> <p><b>Modules</b></p> <ul style="list-style-type: none"> <li>- Creating module</li> <li>- Using module with "import module" and "from module import" i.e. various types of methods to import module</li> <li>- PYTHONPATH for modules</li> </ul> <p><b>File handling</b></p> <ul style="list-style-type: none"> <li>- Different types of file handling modes</li> <li>- Reading from files using read(), readline() and readlines()</li> <li>- Writing to files using write() and writelines()</li> <li>- Using seek() and tell()</li> <li>- Random Access using Binary files</li> <li>- Zipping and Unzipping files</li> </ul>
<b>3</b>	<p><b>Object Oriented Programming</b></p> <ul style="list-style-type: none"> <li>- Basic structure of class in Python</li> <li>- Use of "self"</li> <li>- Types of methods : class method, static methods and instance methods</li> <li>- Types of variables : Class variable and instance variable</li> <li>- Inner class</li> <li>- Different types of Inheritance</li> <li>- Method Resolution Order (MRO) in Multiple inheritance</li> <li>- Method overloading (example of all types of operators)</li> <li>- Method overriding</li> <li>- Operator overloading in Python</li> <li>- Creating interface in Python</li> <li>- Creating Abstract class in Python</li> </ul>
<b>4</b>	<p><b>Data Science, Drawing Graphs and Regular Expression</b></p> <p><b>Data Science</b></p>

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	<ul style="list-style-type: none"> <li>- Understand and installing "pandas"</li> <li>- Create data frames in different ways using excel files, csv files, list or tuples</li> <li>- Different operations and functions of "pandas" i.e. head(), tail(), shape, columns, size, dtypes, describe(), max(), min()</li> <li>- Indexing and sorting using pandas : index, set_index, loc, reset_index, sort_values()</li> <li>- Handling null using pandas :dropna() and fillna()</li> </ul> <p><b>Drawing Graphs</b></p> <ul style="list-style-type: none"> <li>- Understand different types of basic graphs</li> <li>- Line Graph, Bar Graph, Histogram Graph and Pie Graph</li> </ul> <p><b>Regular Expression</b></p> <ul style="list-style-type: none"> <li>- Basics of regular expression</li> <li>- Use of match(), search(), findall(), compile() and sub()</li> <li>- Sequence Characters in expression</li> <li>- Quantifies in expression</li> <li>- Special characters in expression</li> <li>- Using regular expression to fetch information from files</li> </ul>
<b>5</b>	<p><b>Database Connectivity</b></p> <ul style="list-style-type: none"> <li>- Different modules for database connectivity</li> <li>- Installing and verifying "MySQLdb"</li> <li>- Connecting, opening and closing database using connect(), open() and close()</li> <li>- Creating cursor for various operations using cursor() and its methods</li> <li>- Executing commands using execute() method</li> <li>- Insert records</li> <li>- Update records</li> <li>- Delete records</li> <li>- Fetching records using fetchone(), fetchmany() and fetchall() methods</li> <li>- Using regular expression to fetch records using python</li> </ul>

**Course Outcomes:**

1. Design basic applications using Python programming language
2. Determine how to implement Exception handling, files and modules in python

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3. Demonstrate how to implement features of OOP in python
4. Develop applications understanding the concepts of Data Science in python
5. Build their ability to implement Database Connectivity using python

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	L	L		L			L	M		L
CO2	H	L	L		L			M	M		M
CO3	H	M	L	L	M			M	M	M	M
CO4	H	H	H	M	H	L	H	H	H	M	H
CO5	H	H	M	M	H	L	M	H	M	M	H

**Text Book:**

1. "Core Python Programming", R Nageswara Rao, Dreamtech Press, 2<sup>nd</sup> Edition

**Reference Books:**

1. "Introduction to Computation and Programming Using Python", John V Guttag, Prentice Hall of India, Second Edition
2. "Core Python Applications Programming", Wesley J Chun, Pearson, 3rd Edition
3. "Professional Python", Luke Sneeringer, WROX Publication, First Edition

**Web References :**

1. "Learn Python the Hard way", <http://learnpythonthehardway.org/>
2. Swaroop C H. "A Byte of Python", <http://www.swaroopch.com/notes/python>

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3. Dive Into Python 3: <http://www.diveintopython.net/>
4. Python for Beginners : <https://www.python.org/about/gettingstarted/>

**App References :**

1. Learn Python
2. SoloLearn Python
3. Python Pattern Programs Free
4. Python Programming App

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	3,4,5,9,10,11
2	9,16,17
3	13,14, 15
4	18,25
5	24 (only related points as prescribed in Syllabus) (Page 650 to Page 677)

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**PRACTICALS**

Unit No	List of Practicals
<p align="center"><b>1</b></p>	<ol style="list-style-type: none"> <li>1. Write a program to input p, r, n and find out interest using simple input output statement.</li> <li>2. Write a program to input 2 numbers and one arithmetic operator. Perform operations as per arithmetic operator which is given as input</li> <li>3. Write a program to enter marks of 4 subjects and display result (result shall include total, percentage and grade)</li> <li>4. Write a program to enter 10 numbers and display all armstrong numbers from those numbers.</li> <li>5. Write a program to enter 10 numbers and display largest odd number from the entered number.</li> <li>6. Define a procedure histogram() that takes a list of integers and prints a histogram to the screen. For example, histogram([4, 9, 7]) should print the following: **** ***** *****</li> <li>7. Write a program to create a list and perform various operations on list using menu.</li> <li>8. Write a Python program to perform following operation on given string input:             <ol style="list-style-type: none"> <li>a) Count Number of Vowel in given string</li> <li>b) Count Length of string (donot use len() )</li> <li>c) Reverse string</li> <li>d) Find and replace operation</li> <li>e) check whether string entered is a palindrome or not</li> </ol> </li> <li>9. Write a program to create a function which accepts 2 numbers and one arithmetic operator. Return the answer accordingly.</li> <li>10. Write a program to create 4 lambda functions which shall accept 2 numbers and one arithmetic operator. As per arithmetic operator related lambda functions shall be invoked.</li> <li>11. Write a program to create function which shall accept any number of arguments and display total of all the numbers given as argument.</li> <li>12. Write a program to display the use of local, global and nonlocal variables</li> <li>13. Write a program to make use of map(), filter() and reduce() functions with context to lambda functions.</li> </ol>
<p align="center"><b>2</b></p>	<ol style="list-style-type: none"> <li>1) Write a program to display basic exception handling in python.</li> <li>2) Write a program to execute user defined exception in python.</li> <li>3) Write a program to generate arithmetic exception and log the exception in system.</li> <li>4) Create a module with 4 functions of your choice. Import and use the</li> </ol>

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	<p>functions using module in different ways.</p> <ol style="list-style-type: none"> <li>5) Write a program to read a file and display its contents. At the end it shall also display no. of words available in file.</li> <li>6) Write a program to read a file which contains only numbers. Display total of all numbers with maximum and minimum number.</li> <li>7) Write a program to copy a text file using file handling mechanism.</li> <li>8) Write a program to read file which has marks entry of student and display details with total, percentage and grade (Consider a file which has comma separated data with RollNo, Student Name, Mark1, Mark2, Mark3 and Mark4)</li> <li>9) Write a program to do student operations using menu as follows             <ol style="list-style-type: none"> <li>a) Add Student</li> <li>b) Search Student</li> <li>c) List All Students</li> <li>d) Update Student</li> <li>e) Delete Student</li> <li>f) Exit</li> </ol> </li> <li>10) Write a program to zip and unzip particular files.</li> </ol>
<b>3</b>	<ol style="list-style-type: none"> <li>1) Write a program to create a simple class with 2 methods and execute both methods</li> <li>2) Write a program to create a class for student with RollNo, Name, Age, Gender and methods named AddStudent() and DisplayStudent()</li> <li>3) Write a program to make use of class method and instance method.</li> <li>4) Write a program to make use of inner class</li> <li>5) Create a Temperature class. Create 2 methods named convertFahrenheit() and convertCelsius().</li> <li>6) Write a Python Program that creates a class and inherit into another class (Base Class : Student with rollno, name, gender, age) (Derived Class : Course with course name, duration, fee)</li> <li>7) Use appropriate functions for each class Write a program to display MRO using multiple inheritance. Multiple inheritance can be done as per your choice.</li> <li>8) Write a program to create abstract class with one method.</li> <li>9) Write a program to create interface and utilize the same in other class.</li> <li>10) Write a program to overload addition (+) and subtraction (-) (Use appropriate methods to overload the same.</li> </ol>
<b>4</b>	<p>Create an excel file with columns RollNo, Name, Gender, E-Mail, Mobile, Age and City. Enter atleast 20 records and then perform following exercise</p> <ol style="list-style-type: none"> <li>1) Write a program to load above excel file and display columns of file and data type of each column.</li> <li>2) Write a program to load above excel file and display following information             <ul style="list-style-type: none"> <li>- List of students from Rajkot City</li> <li>- List of Male students</li> <li>- List of Male students from Rajkot City</li> </ul> </li> </ol>

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	<ul style="list-style-type: none"> <li>- List of students whose age <math>\geq 20</math></li> <li>3) Write a program to load above excel file and use dropna() and fillna() functions separately.</li> <li>4) Write a program to enter the profit of 5 years and display the profit as line graph.</li> <li>5) Write a program to enter the name of 5 companies and its employee size and display as bar graph.</li> <li>6) Write a program to enter age of 50 students and create a histogram to display age as group of 0-10, 11-20, 21-30, 31-40, 41-50, 51-60, 60-120</li> <li>7) Write a program to read above excel file and how many male and female students are there using bar graph.</li> <li>8) Write a program to enter course and no. of students in each course. Display information using pie graph. The course with maximum students shall be displayed separately as a separate slice of pie graph.</li> <li>9) Write a program to read above file and use regular expression in order to display records who has valid emails.</li> <li>10) Write a program to read above file and use regular expression to display only those records who have mobile number with country code. For example, 91-9999933333 (2 digits of country code and 10 digits of mobile)</li> </ul>												
<b>5</b>	<p>Consider a student table with following columns for all database related programs (rollno, name, gender, age, email, mobile, city)</p> <ul style="list-style-type: none"> <li>1) Write a program to display all the records of student table (make use of fetchone() method)</li> <li>2) Write a program to display all the records of student table (make use of fetchall() method)</li> <li>3) Write a program to search for particular student and display the details of student. If student is not found, related message shall be displayed</li> <li>4) Write a program to insert the details of student in above table</li> <li>5) Write a program to update the details of student in above table</li> <li>6) Write a program to delete the details of student in above table</li> <li>7) Write a program to display only those records who have valid email address as their information. Use regular expression here.</li> <li>8) Write a program to load all the records from table and display only those details where names start with "N" and has length of 5 characters.</li> <li>9) Write a program to create a list with 3 columns for name, data type and size. Create table as per the information entered. Consider following example</li> </ul> <table border="1" data-bbox="370 1671 1177 1820" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">name</td> <td style="width: 33%;">varchar</td> <td style="width: 33%;">20</td> </tr> <tr> <td>qualification</td> <td>varchar</td> <td>20</td> </tr> <tr> <td>post</td> <td>varchar</td> <td>20</td> </tr> <tr> <td>salary</td> <td>int</td> <td>6</td> </tr> </table> <p>Once above information is stored in list, program shall create a table from</p>	name	varchar	20	qualification	varchar	20	post	varchar	20	salary	int	6
name	varchar	20											
qualification	varchar	20											
post	varchar	20											
salary	int	6											

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	above information. 10) Write a menu based program to perform following information. - Insert Student - Update Student - Search Student - Delete Student - List Students - Exit
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**Requirement of Laboratory Support:**

Students need to install **Python** Programming tool using the following link :

<https://www.python.org/downloads/>

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- **Sem.** :3
- **Subject Code** :05MC0203
- **Subject** : Mobile Programming
- **Course Objectives** :
  1. To acquire knowledge of android basics required for Android App Development
  2. To understand UI designing and Fragment in android
  3. To integrate advance application concepts like Google Map, Animation in Android Application
  4. To implement the concepts of SQLite, Content Provider and Shared Preferences in Android Application
  5. To learn how to publish Android App on Google Play store

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** :OOP concepts, Core Java and RDBMS

Unit No	Topics Covered
<b>1</b>	<b>Basics of Android:</b> <ul style="list-style-type: none"> <li>• Introduction of Android</li> <li>• History of Android</li> <li>• OHA</li> <li>• Android Development Tools</li> <li>• Android SDK</li> <li>• Android Studio Environment</li> <li>• Building Blocks of Android</li> <li>• Android Architecture</li> <li>• AVD</li> <li>• Activity Life-Cycle</li> <li>• AndroidManifest.xml file</li> </ul>

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	<ul style="list-style-type: none"> <li>• Anatomy of Android Application</li> <li>• Building a Sample Android App</li> </ul>
<b>2</b>	<p><b>Android UI Design Essentials:</b></p> <ul style="list-style-type: none"> <li>• Working withIntents</li> <li>• Types of Intents</li> <li>• Fundamentals of android UI design</li> <li>• Layouts (Linear, Relative, Table, Frame, Absolute)</li> <li>• Introduction to adapters</li> <li>• Widgets in android like Toast, TextView, EditText, RadioButton, RadioGroup, Spinner, ListView, Button, ImageButton, ToggleButton, CheckBox, AutoCompleteTextView, MultiAutoCompleteTextView, RatingBar, DatePicker, TimePicker, ProgressBar, AnalogClock, DigitalClock, ScrollView, RecyclerView, ImageViewetc</li> <li>• Working with WebView</li> <li>• Introduction to Fragment</li> <li>• Fragment Life-Cycle</li> </ul>
<b>3</b>	<p><b>Android UI Design Essentials:</b></p> <ul style="list-style-type: none"> <li>• Animation (Frame-by-Frame, Tween)</li> <li>• Menu (Options, Context)</li> <li>• Introduction to Action Bar</li> <li>• Working with Alarm</li> <li>• Working with Telephony API</li> <li>• Send SMS</li> <li>• Working with AsyncTask</li> <li>• Working with VideoView</li> <li>• Introduction to styles and themes</li> <li>• Working with Camera</li> <li>• Working with Service</li> <li>• Service Life-Cycle</li> <li>• Types of Service</li> <li>• Working with AudioManager</li> </ul>
<b>4</b>	<p><b>Working with Data and Storage in Android:</b></p> <ul style="list-style-type: none"> <li>• Dialogs</li> <li>• AlertDialog</li> <li>• Creating, saving and retrieving shares preferences</li> <li>• Managing and working with data using SQLite</li> <li>• Sharing data between Applications using Content Provider</li> <li>• Understanding Content URI</li> <li>• ContentResolver</li> <li>• Internal Storage</li> <li>• External Storage</li> </ul>
<b>5</b>	<b>Location Based Services, Hardware Sensor and Web</b>

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	<p><b>Services:</b></p> <ul style="list-style-type: none"> <li>• Location API fundamentals</li> <li>• Using Location Based Services</li> <li>• Finding Current Location and Listening for Changes in Location</li> <li>• Introduction to Geocoder</li> <li>• Working with Google Maps</li> <li>• Sensor API</li> <li>• Types of Sensor</li> <li>• Sensor class</li> <li>• SensorManager class</li> <li>• SensorEvent class</li> <li>• SensorEventListener Interface</li> <li>• Introduction to JSON Parsing</li> <li>• Introduction to Monetization of Android App</li> <li>• Signing and Publishing Android App</li> </ul>
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**Course Outcomes:** (After completion of this course student should be able to)

1. Describe android architecture and basics of android development
2. Design UI and develop Fragment for Android App
3. Develop an Android App using Animation, Sensors, Google Map Services, Background threads
4. Build their ability to develop anApplication by applying the knowledge of persistence Data Storage mechanism in Android
5. Demonstrate how to publish Android App in Android Market

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H		L			H	M	L	H		H
CO2	L	L	H			M	L	H		L	
CO3	L	M	H			M	L	H			M
CO4	L	M	H			M	L	H			H
CO5	L	L	M	L	L	M	L	H	M		

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**Text Book:**

1. **Professional Android 4 Application Development, Reto Meier**  
**Wiley India Pvt Ltd, Second Edition**

**Reference Books:**

1. **Android Wireless Application Development, Darcey Lauren and Shane Conder, Pearson Education, Third Edition**
2. **Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd, Second Edition**
3. **Beginning Android Application Development, Wei-Meng Lee, Wiley India Pvt. Ltd., First Edition**

**Web References:**

1. <https://developer.android.com>
2. <https://www.tutorialspoint.com/android/index.htm>

**App References:**

1. **Learn Android – Android App Development**
2. **Android Tutorial – Learn Android Online**

**Syllabus Coverage from text book:**

Unit #	Chapter Numbers
1	1,2,3
2	4,5,6
3	3,4,6,8,9,10
4	5,6
5	7,10

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**PRACTICALS**

Sr. No	List of Practicals
<b>Unit – 1</b>	
<b>1.</b>	Installing "Android Studio IDE" and "Android SDK"
<b>2.</b>	Write your First Android App
<b>3.</b>	Create "Hello World" application. That will display "Hello World" in the middle of the screen also change the text color and background color of the text
<b>4.</b>	Create an application that designs a layout with a text box and button named Submit. The user should enter the text in the text box. When the submit button is clicked then the text in the text box should be displayed in the toast
<b>5.</b>	Create an application to demonstrate Android Activity Life Cycle.
<b>Unit –2</b>	
<b>6.</b>	Create an application with login module (Check username and password) On successful login, go to next screen. And when login fails, alert user using Toast. Also pass username to next screen.
<b>7.</b>	Create an application that designs a layout having two text boxes user name and password. The user and password will be taken from the user. The username and password will be verified. If the verification is successful then a new layout will appear which will display username and password.
<b>8.</b>	Create an application to call specific entered number by user in the Edit Text
<b>9.</b>	Create an application that will show List of Countries in One fragment, when we click on the name of any country, the second fragment should display the flag of the Country whose name is clicked in the first fragment
<b>10.</b>	Create an android application which helps us to create a simple calculator with basic functions of clear, add, multiply, subtract, divide and mod
<b>11</b>	Create an application to demonstrate the use of ToggleButton
<b>12</b>	Create an application to demonstrate the use of ImageButton
<b>13</b>	Create an application to demonstrate the use of ListView
<b>14</b>	Create an application to demonstrate the use of Spinner
<b>15</b>	Create an application to demonstrate the use of CheckBox

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<b>16</b>	Create an application to demonstrate the use of RadioButton
<b>17</b>	Create an application to demonstrate the use of RadioGroup
<b>18</b>	Create an application to demonstrate the use of ImageView
<b>19</b>	Create an application to demonstrate the use of TextView, EditText and Button
<b>20</b>	Create an application to demonstrate the use of RatingBar
<b>21</b>	Create an application to demonstrate the use of AutoCompleteTextView
<b>22</b>	Create an application to demonstrate the use of MultiAutoCompleteTextView
<b>23</b>	Create an application to demonstrate the use of DatePicker
<b>24</b>	Create an application to demonstrate the use of TimePicker
<b>25</b>	Create an application to demonstrate the use of ProgressBar
<b>26</b>	Create an application to demonstrate the use of AnalogClock
<b>27</b>	Create an application to demonstrate the use of DigitalClock
<b>28</b>	Create an application to demonstrate the use of RecyclerView
<b>Unit –3</b>	
<b>29</b>	Create an application to demonstrate the use of Context Menu
<b>30</b>	Create an application where a user takes an ImageView, and buttons, the number of buttons depends on Tween animation effects the user wants, on clicking a particular button the particular effect of tween animation should be applied on an ImageView.
<b>31</b>	Create an application to demonstrate the use of RelativeLayout
<b>32</b>	Create an application to demonstrate the use of TableLayout.
<b>33</b>	Create an application where the UI consists of an EditText and a Button when the user clicks on the Button the URL entered in the EditText should be displayed on the screen
<b>34</b>	Create an application to demonstrate the use of AbsoluteLayout
<b>35</b>	Create an application that will change color of the layout, based on selected options from the menu
<b>36</b>	Create an application to demonstrate the use of Frame-by-

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	Frame animation
<b>37</b>	Create an application to demonstrate the use of WebView.
<b>38</b>	Create an application to demonstrate the use of ActionBar
<b>39</b>	Create an application that works like an alarm
<b>40</b>	Create an application to Send SMS between two Emulators
<b>41</b>	Create an Application where we have one ImageView and one Button on Clicking the Button a picture should be clicked using the Device Camera and should be displayed in the ImageView
<b>42</b>	Create an Application to demonstrate the use of Service in Android
<b>43</b>	Create an Application to demonstrate the use of AudioManager in Android
<b>Unit –4</b>	
<b>44</b>	Create an application to demonstrate the use of AlertDialog
<b>45</b>	Create an application that designs a layout to display contact label (name) and phone no stored in the contacts using content provider. When the user selects any contact label (name) from the list view dialer application should be launched and call should be made using dialer application.
<b>46</b>	Create an application to demonstrate the use of SharedPreferences.
<b>47</b>	Create an application to store the data in Internal Storage
<b>48</b>	Create an application to store the data in External Storage
<b>49</b>	Create an application that designs a layout with 3 text boxes and an options menu. The options menu should contain options like Simple Interest and compound Interest. The text boxes should be used for the input of information like the principal amount, rate of interest and number of years. Then clicking on the option from menu appropriate operation should be performed and correct result should be displayed
<b>50</b>	Create an application to demonstrate the use of VideoView
<b>Unit –5</b>	
<b>51</b>	Create an Application and use Location Services in it
<b>52</b>	Create an Application to demonstrate use of Sensors in android
<b>53</b>	Create an Application to demonstrate how to do JSON parsing in

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	android
<b>54</b>	Create an application that designs a layout having text boxes and button submit. The details of doctor like doctor's id, first name, last name, mobile number, address, city and specialization should be entered by the user in the textboxes and on clicking on the button submit the data should be saved into the database. Create another layout that contains a text box, a button search and a text view that gives searching facility. User can search doctor's full information by providing doctor's id in the text box. On clicking on button search the information of the doctor should be displayed in text view. Doc_detail (doc_id, firstname, lastname, mob, add, city, specialization)

**Requirement of Laboratory Support:**

Students need to install **Android Studio** using the following link :

[https://developer.android.com/studio?gad\\_source=1&gclid=CjwKCAjwydSzBhB OEiwAj0XN4L16lzVQU7mJnJrcwMEdVtY-kyd3LuBP64TG-B5LnsEbMscnZcVvXBoCG1UQAvD\\_BwE&gclsrc=aw.ds](https://developer.android.com/studio?gad_source=1&gclid=CjwKCAjwydSzBhB OEiwAj0XN4L16lzVQU7mJnJrcwMEdVtY-kyd3LuBP64TG-B5LnsEbMscnZcVvXBoCG1UQAvD_BwE&gclsrc=aw.ds)

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- **Sem.** : 2
- **Subject Code** : 05MC0204
- **Subject** : Mini Project - 1
- **Course Objectives** :
  1. To identify real world problem and analyze it.
  2. To know about project develop process with industry exposure.
  3. To gain knowledge about various phases of project development such as analysis, coding and testing.
  4. To develop skills of project documentation.
  5. To develop skills of latest technologies.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	30	NA	70

- **Prerequisites** : Concept of any Programming Language, Fundamentals of Software Engineering, knowledge of database.
- **Project guidelines** :
  - It is suggested to develop any web/desktop/Mobile application using emerging technologies of current semester.
  - Select project definition as per industry oriented.
  - Project team size should be of 2 to 3 students in each group.
  - Project definition concept should be unique.
  - This is user defined project so it may or may not be live project.
  - It is recommended to follow SDLC phase in development.
  - Coding standard should be followed properly with necessary comments.

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- It is recommended to apply object oriented methodology in project development process with the concept of reusability of classes and packages, if it is applicable.
- Prepare appropriate test cases to test your algorithm and outcome of the project at the end of development process.
- Progress review will be evaluated periodically by assigned internal guide as per given milestone schedule.
- Documentation report will be prepared of project as per format.

**Documentation Report Format:**

<b>Chapters</b>	<b>Particulars</b>
<b>1</b>	<b>SYNOPSIS</b>
<b>2</b>	<b>PREAMBLE</b>
2.1	General Introduction
2.2	Statement of Problem
2.3	Objective of the Study
2.4	Scope of the Study
2.5	Methodology
2.6	Feasibility Study
<b>3</b>	<b>REVIEW OF LITERATURE</b>
<b>4</b>	<b>TECHNICAL DESCRIPTION</b>
4.1	Hardware Requirement
4.2	Software Requirement

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<b>5</b>	<b>SYSTEM DESIGN AND DEVELOPMENT</b> <b>(Only applicable diagrams)</b>
5.1	Architectural Design
5.2	Object Modeling
5.2.1	Class Diagram
5.3	Dynamic Modeling
5.3.1	Use Case Diagram
5.3.2	Sequence Diagram
5.3.3	Collaboration Diagram
5.4	Database Design
5.4.1	Table Structure
5.4.2	Relationship Diagram
5.5	Menu Design
5.6	Screen Design
<b>6</b>	<b>SYSTEM TESTING</b>
6.1	Testing and Implementation
6.2	Testing Methodology
6.2.1	Unit Testing
6.3	Validation Checking
6.4	System Implementation
6.5	Implementation Procedure
<b>7</b>	<b>CONCLUSION</b>
<b>8</b>	<b>LEARNING DURING PROJECT WORK</b>
<b>9</b>	<b>BIBLIOGRAPHY</b>
<b>9.1</b>	Online References
<b>9.2</b>	Offline References

**Course Outcomes:**

Students will be aware about overall project development process for giving real life problem solutions.

Students will learn about implementation of their knowledge of programming concepts.

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- **Sem.** :2
- **Subject Code** : 05MC0205
- **Subject** : NoSQL Databases
- **Course Objectives** :
  1. To understand concept of big data and NoSQL databases.
  2. To work with NoSQL Key/Value databases using Redis.
  3. To work with Document-based NoSQL databases using MongoDB.
  4. To work with Column-oriented NoSQL databases using Cassandra.
  5. To work with Graph Based Databases using Neo4j.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisite:** Knowledge of database concepts and SQL

Unit No	Topics Covered
<b>1</b>	<b>Introduction of Big Data :</b> Data, Dataset, Types of Data, Definition of Big Data, Characteristics of Big Data, Cluster, File Systems and Distributed File Systems, Sharding, Replication, Sharding and Replication, ACID, CAP and BASE theorem
<b>2</b>	<b>Introduction of NoSQL:</b> Introduction: Where is it used? What is it?, Types of NoSQL databases, Why NoSQL?, Advantages of NoSQL, Use of NoSQL in Industry, SQL vs NoSQL, NewSQL  <b>NoSQL Key/Value databases using Redis :</b>

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	Introduction of Redis, Redis Data Structures, Redis commands – String commands, List commands, Set commands, Sorted Set commands, Hash commands
<b>3</b>	<b>Document-based NoSQL databases using MongoDB :</b> What is MongoDB, Why MongoDB, using JSON to MongoDB key features, Core Server tools, MongoDB through the JavaScript's Shell, Creating Document Oriented Data – Schema and collections, Constructing Queries, FIND and FINDONE, SKIP, Sort, LIMIT, SELECTOR Matching, RANGES, Range query operators, Set Operators, Querying for a document with specific Key, Arrays, Query Options – projections, Aggregation, Updates, atomic Operations, Deletes, Modifying Data Stores, Indexing, Drop, Text Search, MongoDB MapReduce and MongoDB with NodeJS
<b>4</b>	<b>Column-oriented NoSQL databases using Cassandra :</b> Apache Cassandra – An Introduction, Features of Cassandra, CQL Data Types, CQLSH, Keyspaces, CRUD (Create, Read, Update, and Delete) Operations, Collections, Using a Counter, Time to Live (TTL), Alter Commands, Import and Export, Querying System Tables
<b>5</b>	<b>Graph Based Databases using Neo4j :</b> Introduction, Data Model, Building Blocks, Creating Nodes, Creating Relationships, CQL write clauses, CQL read clauses, CQL general clauses, CQL functions

**Course Outcomes : (Students will be able to)**

1. Understand fundamentals of Big Data and NoSQL databases.
2. Discuss different Redis commands.
3. Define the concept of MongoDB
4. Define different operations of Cassandra.
5. Apply the concept of graph in Neo4j.

**Course Outcomes – Program Outcomes Mapping Table :**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H		L	H				H		M

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CO2	L	H							M		H
CO3	L	H							M		H
CO4	L	H							M		H
CO5	M	H							M		H

**Text Book :**

1. Big Data Fundamentals: Concepts, Drivers and techniques, Thomas Erl, Wajid Khattak, and Paul Buhler, Pearson, First Edition
2. "Big Data and Analytics", Seema Acharya, Subhashini Chellappan Wiley India Pvt. Ltd., 2015, First Edition
3. Professional NoSQL, Shashank Tiwari, WROX, First Edition

**Reference Books :**

1. "Understanding Big data ", Chris Eaton, Dirk deRooset al. , McGraw Hill, 2012, First Edition
2. MongoDB in Action, Kyle Banker, Piter Bakkum, Shaun Verch, Dream tech Press, First Edition
3. Big Data Black Book, DreamTech, First Edition

**Web References :**

1. <https://redislabs.com/>
2. <http://www.bigdatauniversity.com>
3. <http://www.mongodb.com>
4. <https://www.tutorialspoint.com/neo4j>
5. <https://www.tutorialspoint.com/cassandra>
6. <https://www.tutorialspoint.com/redis>

**App References :**

1. MongoDB, SuperDreamEducation
2. Learn - Cassandra DBMS, SoftecksEducation

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**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book 1 : chapter 1 and 5
2	Book 2 : chapter 4.1, Book 3 : chapter 4,5,6,7 (only Redis Commands)
3	Book 2 : Chapter 6
4	Book 2 : Chapter 7
5	Book 3 : chapter 1 (graph databases), <a href="https://www.tutorialspoint.com/neo4j">https://www.tutorialspoint.com/neo4j</a>

**PRACTICALS**

Unit No	List of Practicals																																								
<b>1</b>	Get and Set operations, LPUSH, RPUSH, LPOP, RPOP, RANGE, SADD, SMEMBERS, SCARD, SISMEMBER, SUNION, SINTER, SDEF, HASH commands																																								
<b>2</b>	<p align="center"><b>MongoDB ex – 1</b></p> <ol style="list-style-type: none"> <li>1. Create a database named “mydb”</li> <li>2. Show all databases.</li> <li>3. Show currently selected database.</li> <li>4. Create a collection named “emp”.</li> <li>5. Show all collections of selected database.</li> <li>6. Insert following documents in emp collection:</li> </ol> <table border="1" data-bbox="568 1402 1437 1759"> <thead> <tr> <th>Empno</th> <th>Ename</th> <th>Sal</th> <th>Desig</th> <th>Dept</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Sachin</td> <td>60000</td> <td>Manager</td> <td>Purchase</td> </tr> <tr> <td>2</td> <td>Kohli</td> <td>50000</td> <td>Manager</td> <td>Sales</td> </tr> <tr> <td>3</td> <td>Dhoni</td> <td>30000</td> <td>Clerk</td> <td>Admin</td> </tr> <tr> <td>4</td> <td>Dravid</td> <td>40000</td> <td>Manager</td> <td>Purchase</td> </tr> <tr> <td>5</td> <td>Bumrah</td> <td>50000</td> <td>Manager</td> <td>Sales</td> </tr> <tr> <td>6</td> <td>Jadeja</td> <td>20000</td> <td>Clerk</td> <td>Admin</td> </tr> <tr> <td>7</td> <td>Ashwin</td> <td>45000</td> <td>Manager</td> <td>Sales</td> </tr> </tbody> </table> <p>Find() 7. List all documents.</p>	Empno	Ename	Sal	Desig	Dept	1	Sachin	60000	Manager	Purchase	2	Kohli	50000	Manager	Sales	3	Dhoni	30000	Clerk	Admin	4	Dravid	40000	Manager	Purchase	5	Bumrah	50000	Manager	Sales	6	Jadeja	20000	Clerk	Admin	7	Ashwin	45000	Manager	Sales
Empno	Ename	Sal	Desig	Dept																																					
1	Sachin	60000	Manager	Purchase																																					
2	Kohli	50000	Manager	Sales																																					
3	Dhoni	30000	Clerk	Admin																																					
4	Dravid	40000	Manager	Purchase																																					
5	Bumrah	50000	Manager	Sales																																					
6	Jadeja	20000	Clerk	Admin																																					
7	Ashwin	45000	Manager	Sales																																					

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8. List all documents with formatted output.
9. List the document of employee whose name is “sachin”
10. List the documents of employee whose salary is less than 30000
11. List employees whose designation is manager and department is sales.
12. List employees whose salary is less than 50000 and designation is manager or department is admin.
13. Arrange the records by name in descending order.
14. List first 3 documents of emp collection.
15. Skip first 3 documents of emp collection.
16. List 3<sup>rd</sup> and 4<sup>th</sup> documents of emp collection.
17. Count no. of employees.
18. List distinct designation.

Aggregate()

19. Calculate annual salary of employees.
20. Display no. of employees designation wise.
21. Display total salary of employees department wise.
22. Display employee whose salary is highest.
23. List highest salary of the employee department wise.
24. Calculate total salary of employees department wise and list whose total is greater than 70000.

Index()

25. Create index on empno field.
26. Check the statistics of the emp collection.
27. Get the list of all indexes created on the emp collection.
28. Use hint method.
29. Use explain method.

Update()

30. Increment salary by 2000 whose name is Sachin.
31. Increment salary by 2000 of all the employees.
32. Update designation of Sachin with CEO.

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33. Update designation of Sachin with 'MD' and insert as new document.

34. Add a new field "remark" to document with name "dhoni" and set remark "head"

35. Remove the added new field.

Save()

36. Replace the whole document whose \_id is 1.

Regular Expression :

37. To find documents from the emp collection where the ename begins with "S". (with and without regex)

38. To find documents from the emp collection where the ename ends with "n". (with and without regex)

39. Modify above query with case insensitivity.

40. To find documents from the emp collection where ename has an "a" in any position.

Dealing with null values :

41. Update the document with null value in designation field where name is "Kohli".

42. To search for null values in designation field.

43. To remove designation field having null values in emp collection where name is "Kohli".

## **MongoDB ex – 2**

Use Java Script in MongoDB – system.js collection

1. Write a function to find sum of two values.
2. Write a function to find factorial of given number.

## **MongoDB ex – 3**

44. Import restaurant.json file.

45. List all documents from restaurant collection.

46. List all restaurant found in "7 Avenue" area.

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47. List all restaurants having score more than 3.
48. List all restaurant located in 7 Avenue with score more than 3.
49. List all restaurants found in 7 Avenue in descending order of their score.
50. Count number of restaurants found in 7 Avenue.
51. Update score of restaurant id "30191841" with 1.
52. Increase ratings of all restaurants found in 7 Avenue having existing score as 2 with 1.
53. Create index on Area field.
54. Backup all data.
55. Remove all restaurants located in area "West 3 Street"
56. Drop collection restaurant

## MongoDB ex – 4

Array :

(Refer class book for food collection)

3. Insert 5 documents in food collection.

_id	Fruits
1	banana, apple, cherry
2	orange, butterfruit, mango
3	pineapple, strawberry, grapes
4	banana, strawberry, grapes
5	orange, grapes

4. List all documents.
5. Find those documents from "food" collection which has the fruits array with banana, apple, cherry.
6. Find those documents from the food collection which has the fruits array having grapes as an element.
7. Find those documents from the collection which have the fruits array having "grapes" in the first index position.
8. Find those documents from the food collection where the size of the array is two. The size implies that the array

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	<p>holds only 2 values.</p> <ol style="list-style-type: none"><li>9. Find those document with <code>_id:1</code> from the food collection and display the first two elements from the array fruits.</li><li>10. Find all documents from the food collection which have elements “orange” and “grapes” in the array fruits.</li><li>11. Find those documents from the food collection which have the element “orange” in the 0<sup>th</sup> position in the array fruits.</li><li>12. Find those documents with <code>_id : 1</code> from the food collection and display two elements from the array fruits, starting with the element at 0<sup>th</sup> index position.</li><li>13. Update the document with <code>_id:4</code> and replace the element present in the 1<sup>st</sup> index position of the fruits array with apple.</li><li>14. Update the document with <code>_id:1</code> and replace the element “apple” of the fruits array with “An Apple”</li><li>15. Update the document with <code>_id:2</code> and push new key value pairs in the fruits array.</li><li>16. Update the document with <code>_id:4</code> by adding an element “orange” to the list of elements in the array fruits.</li><li>17. Update the document with <code>_id:4</code> by popping an element form the list of elements present in the array fruits. The element popped is the one from the end of the array.</li><li>18. Update the document with <code>_id:4</code> by popping an element from the list of elements present in the array fruits. The element popped is the one from beginning of the array.</li><li>19. Update the document with <code>_id:3</code> by popping two elements from the list of elements present in the array fruits. The elements popped are “pineapple” and “grapes”.</li><li>20. Update the documents having banana as an element in the array fruits and pop out the element banana from those documents.</li><li>21. Update <code>_id:4</code> and unset the element present in the 1<sup>st</sup> index position of the fruits array with null.</li></ol>
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## **MongoDB ex – 5**

1. Demonstrate automatic generation of unique numbers for the `_id` field.
2. Demonstrate Map Reduce in MongoDB.
3. Create a database named “Store” in MongoDB with a collection called “Sales” containing documents with some or all of the following fields: `customerId`, `customerName`, `gender`, `dataOfBirth`, `contactNumber`, `address` (containing fields: `houseNo`, `street`, `area`, `city`, `pincode`), `orders`(containing fields: `orderId`, `orderDate`, `items`(containing fields: `itemId`, `itemName`, `itemPrice`, `quantityOrdered`, `discount`)). Note that some customers may not provide their date of birth and/or contact number. Also, not all products would be sold at a discount. Perform the following operations on the database (either in the console or using any programming language):

- (i) Insert records for 3 customers and 5 items in at least 20 orders.
- (ii) Update the contact number of a particular customer.
- (iii) Display `customerId`, `customerName`, `gender`, `contactNumber`, of customers residing in “Ahmedabad”.
- (iv) Display city-wise count of customers
- (v) Use MapReduce function to display the number of times each item was sold.

## **MongoDB ex – 6 (mongodb with node.js)**

Install node.js from page <http://nodejs.org/download>.

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	<p>Write a Node.js web application that presents users with a book issue form containing following fields and a submit button. The fields should be: Book name, isbn number, author name( can be more than one author), issue date, return date, price, member identification number, book category ( it can be reference book, text book, journal, magazine), status ( 1 for available and 0 for not available)</p> <p>Set up a route to handle a POST request of this form. This route should use the Node.js MongoDB driver to insert a Library document into MongoDB. Check that you are inserting records correctly in the Mongo shell with some find() commands.</p> <p>Perform the following queries using MongoDB database</p> <ol style="list-style-type: none"> <li>1. List book details which is issued to member “MC01”</li> <li>2. How many books for “computer network” and “ network security”</li> <li>3. Update the library document and remove return date field.</li> <li>4. List total number of books categorywise</li> <li>5. List all books which is either text book or reference book.</li> <li>6. Sort the document based on price ( book having max price comes first)</li> <li>7. Count total number of books which is not available for ‘journal’ category</li> <li>8. Create an index for library collection.</li> </ol>
<b>3</b>	CRUD operations in Emp table given in mongodb ex – 1
<b>4</b>	Create node with label and properties, returning node, create relationship between nodes, Write Clauses, Read Clauses, General Clauses ( Return, Order By, Limit, Skip, with unwind), String and Aggregation functions, Backup and Restore, Index



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**Requirement of Laboratory Support:**

Students need to install Redis, Cassandra, Mongo DB, Neo4j tools for practical practice.

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- **Sem.** : 2
- **Subject Code** : 05MC0206
- **Subject** : Image Processing
- **Course Objectives** :
  1. To give primary concepts of digital image processing.
  2. To interpret, understand and analyze image in its numeric and graphical form.
  3. To understand & apply geometric relationship of pixels and its operations.
  4. To understand & apply the different types of preprocessing and post processing steps on image.
  5. To know the various applications of image processing field.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisites:** Basic knowledge of Matrix operations, Linear Algebra & probability theory, Basic Programming knowledge of C/Python

Unit No	Topics Covered
<b>1</b>	<b>Introduction of Digital Image terminologies</b> <ul style="list-style-type: none"> <li>• Overview of terms : Pixel and its value, Image size, resolution, Image Coordinate System,</li> <li>• Introduction of various file formats of digital Image : GIF,PNG,JPEG,BMP image formats, Concept of Raster Vs Vector Data</li> <li>• Concept of color image : Organization of Color Images , Color Spaces and Color Conversion</li> </ul>
<b>2</b>	<b>Histograms and Point operations</b>

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	<ul style="list-style-type: none"> <li>• Introduction of Histogram, Interpreting Histograms, Computing Histograms, Histograms of Images with More than 8 Bits, Color Image Histograms</li> <li>• Overview of Point operations, Modifying Image Intensity, Point Operations and Histograms, Automatic Contrast Adjustment &amp; Modified it, Histogram Equalization</li> </ul>
<b>3</b>	<p><b>Overview of Filters and edges</b></p> <ul style="list-style-type: none"> <li>• Concept of Filters, Linear Filter and NonLinear Filter. Formal Properties of Linear Filters, Implementing Filters,</li> <li>• Concept of Edges, Gradient-Based Edge Detection, Edge Operators, Edge Sharpening,</li> </ul>
<b>4</b>	<p><b>Concept of Image pre-processing</b></p> <ul style="list-style-type: none"> <li>• Pixel brightness transformations, Geometric transformations, Local pre-processing : Image smoothing, Edge detectors, Scale in image processing, Canny edge detection, Parametric edge models, Edges in multi-spectral images,</li> <li>• Local pre-processing in the frequency domain, Line detection by local pre-processing operators, Detection of corners (interest points), Detection of maximally stable extremal regions Image restoration,</li> </ul>
<b>5</b>	<p><b>Image Segmentation</b></p> <ul style="list-style-type: none"> <li>• Concept of Thresholding, Edge-based segmentation, Region-based segmentation, Matching : Template matching, Control strategies of templating, Evaluation issues in segmentation : Supervised evaluation, Unsupervised evaluation</li> </ul>

**Course Outcomes:**

1. Students will be able to understand image representation & Enhance image quality using image processing.
2. Students will be able to understand Intensity transformation and Histogram processing to analyze image structure.
3. Students will be able to implement filter on given image using frequency domain filtering technique

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4. Students will be able to identify the proper image restoration technique to remove degradation from given image.
5. Students will be able to understand and representation of color image processing with various models.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		L		M		L		H	L		
CO2			L		M		L			M	
CO3	L		H			M			M	H	L
CO4		L		L			H	L		H	
CO5	L		H		M			M			H

**Text Book :**

1. Principles of Digital Image Processing, Wilhelm Burger, Mark J. Burge, Springer Science & Business Media
2. Image Processing, Analysis and Machine Vision, Milan Sonka, Vaclav Hlavac, and Roger Boyle , Global Engineering: Timothy L. Anderson Publisher, Forth Edition.

**Reference Books :**

1. Fundamentals Digital Image Processing, Jain Anil K., Prentice Hall India, 2010
2. Digital Image Processing, Pratt W.K, 3rd ed., John Wiley & Sons, 2007
3. The Image Processing Handbook, John C. Russ, CRC Press, 2007.
4. Digital Image Processing, Gonzalez & Wood, 3rd Edition

**Web References :**

1. <https://nptel.ac.in/courses/106/105/106105032/>
2. [https://www.python-course.eu/python\\_image\\_processing.php](https://www.python-course.eu/python_image_processing.php)
3. <https://www.tutorialspoint.com/dip/index.htm>

**App References :**

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1. Digital Image Processing Tutorial, Galaxy Production
2. Image Processing , RNDCS
3. Digital Image Processing, Engineering Apps

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Text Book : 1, Chapter : 1,8
2	Text Book : 1, Chapter : 3, 4.1 To 4.5
3	Text Book : 1, Chapter : 5,6
4	Text Book : 2, Chapter : 5
5	Text Book : 2, Chapter : 6

**PRACTICALS**

**Unit – 1**

Perform practical to read and display digital image using Python

1. Introduction to OpenCV, Scikit-image, SciPy libraries of Python with Basic commands.
2. Read any image and identify pixel value with RGB colour.
3. Read image and displays its size
4. Convert color image into gray-scale image
5. Convert color image into black & white
6. Display image details.
7. Separate color image in three R G & B planes
8. Create color image using R, G and B three separate planes
9. Crop image.
10. Rotate Image.

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**Unit : 2**

Read any color image and perform histogram operations

1. Create a histogram of color image.
2. Apply point operations on image.
3. Apply Thresholding on image.
4. Calculate mean value of image .
5. Apply Brightness / Contrast to image by changing mean value.

**Unit : 3**

Perform the following filtering operations on image :

1. Read an image and apply linear and non linear filter.
2. Read any image and perform edge detection using various methods.
3. Apply spatial filtering on Image.
4. Apply Dilation process on image to make it sharper.
5. Apply various Edge operators on image.

**Unit : 4**

A) To write a program which apply the following geometric transformation

1. Scaling
2. Rotation
3. Shrinking
4. Zooming
5. Resize

B) Apply various Edge detection method on image.

**Unit : 5**

1. Read an image and apply various type of Thresholding
2. Read an image and apply Edge based segmentation.
3. Read an image and identify region of the object.
4. Read an image and segment various objects from image.
5. Read an image and apply template matching for verifying about similarity of



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images.

**Requirement of Laboratory Support:**

Students need to install **Python Programming** tool using the following link :

<https://www.python.org/downloads/>

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- **Sem.** : 2
- **Subject Code** : 05MC0207
- **Subject** : Data Analytics and Visualization
- **Course Objectives:**
  1. To develop proficiency in data science using python.
  2. To understand how different types of object can be used in python.
  3. To understand the Data cleaning & importing data from different file format.
  4. To explore knowledge of Data frame in python data-analysis.
  5. To learn different techniques of data visualization in order to provide new insights in data analysis.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisites:** Basic Knowledge of Programming Languages

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Unit No	Topics Covered
1	<p><b>Introduction to Data Science with Python :</b></p> <p>The Stages of Data Science, Basic features of Python, Basics of Python Programming, Fundamental Python Programming techniques, Data cleaning and manipulation techniques, Abstraction of the series and Data Frame, Running basic inferential Analyses</p>
2	<p><b>Data Collection Structures :</b></p> <p><b>Lists :</b> Creating Lists, Accessing values in Lists, Adding and updating Lists, Deleting List Elements, Basic List operations, Indexing-Slicing and matrices, Built-in List Functions and Methods, List sorting and traversing, List and strings, Parsing Lines and aliasing</p> <p><b>Dictionaries :</b> Creating Dictionaries, Updating and accessing values in Dictionaries, Deleting Dictionary elements, Built-in Dictionary Functions, Built-in Dictionary Methods</p> <p><b>Tuples:</b> Creating Tuples, Concatenating Tuples, Accessing values in Tuples, Basic Tuple Operations</p> <p><b>Series:</b> Creating a Series with index, Creating a Series from a Dictionary, Creating a Series from a Scalar value, Vectorized operations and Label Alignment with Series</p> <p><b>Data Frames:</b> Creating Data Frames from a Dict of Series or Dicts, Creating Data Frames from a Dict of Ndarrays/Lists, Creating Data Frames from a structured or Record Array, Creating Data Frames from a List of Dicts, Creating Data Frames from a Dict of</p>

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	Tuples, Selecting- Adding-and Deleting Data Frame Columns, Assigning new columns in Method Chains, Indexing and Selecting Data Frames, Transposing a Data Frame, Data Frame Interoperability with Numpy Function
<b>3</b>	<b>Data Gathering and Cleaning :</b>  Cleaning Data – Checking of Missing value, Handling the Missing values, Reading and cleaning CSV Data, Merging and integrating Data
<b>4</b>	<b>Data Analysis :</b>  Statistical Analysis, Data Grouping, Iterating through Groups, Aggregation, Transformations, Filtration
<b>5</b>	<b>Data Visualization :</b>  <b>Direct Plotting</b> – Line Plot, Bar Plot, Pie Chart, Box Plot, Histogram Plot, Scatter Plot  <b>Seaborn Plotting System</b> - Strip Plot, Box Plot, Swarm Plot, Joint Plot  <b>Matplotlib Plot</b> – Line Plot, Bar Chart, Histogram Plot, Scatter Plot, Stack Plot, Pie Chart

**Course Outcomes:**

1. Understanding of basic concepts of python programming.
2. Interpretation of various type of object of python.
3. Handling of Data import & data cleaning before analysis.
4. Understanding of Various data Exploring & data frame usage in data analysis.
5. Visualization of various graphs to get insight of the data.

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**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		H			L						M
CO2	H				M					L	
CO3		L	M							M	
CO4		H	L						M		
CO5	M	L									H

**Text Book:**

1. "Data Analysis and visualization using Python", by Dr. OссamaEmbarak

**Reference Books:**

1. "Introduction to Computation and Programming Using Python", John V Guttag. ,2nd Edition, Prentice Hall of India
2. Core Python Programming, R Nageswara Rao, 2nd Edition, Dreamtech Press
3. Core Python Applications Programming, Wesley J Chun, 3rd Edition. Pearson

**Web References:**

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1. "Python Programming",  
[http://en.wikibooks.org/wiki/Python\\_Programming](http://en.wikibooks.org/wiki/Python_Programming)
2. "The Python Tutorial",  
<http://docs.python.org/release/3.0.1/tutorial/>

**App References:**

1. [https://play.google.com/store/apps/details?id=com.androfrenzy.datascience&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.androfrenzy.datascience&hl=en_IN&gl=US)
2. [https://play.google.com/store/apps/details?id=com.admob9931.python\\_panda&hl=en\\_IN&gl=US](https://play.google.com/store/apps/details?id=com.admob9931.python_panda&hl=en_IN&gl=US)

**Syllabus Coverage from text /reference book & web/app reference:**

<b>Unit #</b>	<b>Chapter Numbers</b>
1	Chapter-1,2 from Text Book
2	Chapter-3 from Text Book
3	Chapter-5 from Text Book
4	Chapter-6 from Text Book
5	Chapter-7 from Text Book

**FACULTY OF COMPUTER APPLICATIONS****Master of Computer Applications****PRACTICALS**

Unit No	List of Practicals
<b>1</b>	<p>1. Write a Python script to prompt users to enter two values; then perform the basic arithmetical operations of addition, subtraction, multiplication and division on the values.</p> <p>2. Write a Python script to prompt users to enter the first and last values and generate some random values between the two entered values.</p> <p>3. Write a Python program to prompt users to enter a distance in kilometers; then convert kilometers to miles, where 1 kilometer is equal to 0.62137 miles. Display the result.</p> <p>4. Write a Python program to prompt users to enter a Celsius value; then convert Celsius to Fahrenheit, where <math>T(^{\circ}\text{F}) = T(^{\circ}\text{C}) \times 1.8 + 32</math>. Display the result.</p> <p>5. Write a program to prompt users to enter their working hours and rate per hour to calculate gross pay. The program should give the employee 1.5 times the hours worked above 30 hours. If Enter Hours is 50 and Enter Rate is 10, then the calculated</p>

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	<p>payment is Pay: 550.0.</p> <p>6. Write a program to prompt users to enter a value; then check whether the entered value is positive or negative value and display a proper message.</p> <p>7. Write a program to prompt users to enter a value; then check whether the entered value is odd or even and display a proper message.</p> <p>8. Write a program to prompt users to enter an age; then check whether each person is a child, a teenager, an adult, or a senior. Display a proper message.</p> <p>9. Write a program to prompt users to enter a year; then find whether it's a leap year. A year is considered a leap year if it's divisible by 4 and 100 and 400. If it's divisible by 4 and 100 but not by 400, it's not a leap year. Display a proper message.</p> <p>10. Write a program to prompt users to enter a Fibonacci sequence.</p>
<p><b>2</b></p>	<p>1. Write a program to create a list of names; then define a function to display all the elements in the received list. Call the function to execute its statements and display all names in the list.</p> <p>2. Write a program to read text file data and create a dictionary of all keywords in the text file. The program should count how many times each word is repeated inside the text file and then find the keyword with a highest repeated number. The program should</p>

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	<p>display both the keywords dictionary and the most repeated word.</p> <p>3. Write a program to compare tuples of integers and tuples of strings.</p> <p>4. Write a program to create a series to maintain three students' names and SPI values.</p> <p>5. Write a program to create a data frame to maintain three students' names associated with their grades in three courses and then add a new column named Mean to maintain the calculated mean mark per course. Display the final data frame.</p> <p>6. Write a program in python to swap two variables without using temporary variable</p> <p>7. Write a program which will allow user to enter 10 numbers and display largest odd number from them. It will display appropriate message in case if no odd number is found.</p> <p>8. Write a Python program to perform following operation on given string input:</p> <ul style="list-style-type: none"><li>a) Count Number of Vowel in given string</li><li>b) Count Length of string (do not use Len ())</li><li>c) Reverse string</li><li>d) Find and replace operation</li><li>e) check whether string entered is a palindrome or not</li></ul> <p>9. Write a program in python to find factorial of user entered number.</p>
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	<p>10. Write a program in python to find factorial of user entered number. (Use recursive Function)</p>
<b>3</b>	<p>Write a Python script to read the data in an Excel file named movies.xlsx and save this data in a data frame called mov. Perform the following steps:</p> <ol style="list-style-type: none"><li>1. Read the contents of the second sheet that is named 2000s in the Excel file (movies.xlsx) and store this content in a data frame called Second_sheet.</li><li>2. Write the code needed to show the first seven rows from the data frame Second_sheet using an appropriate method.</li><li>3. Write the code needed to show the last five rows using an appropriate method.</li><li>4. Use a suitable command to show only one column that is named Budget.</li><li>5. Use a suitable command to show the total rows in the first sheet that is called 2000s.</li></ol>

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	<p>6. Use a suitable command to show the maximum value stored in the Budget column.</p> <p>7. Use a suitable command to show the minimum value stored in the Budget column.</p> <p>8. Write a single command to show the details (count, min, max, mean, std, 25%, 50%, 75%) about the column User Votes.</p> <p>9. Use a suitable conditional statement that stores the rows in which the country name is USA and the Duration value is less than 50 in a data frame named USA50. Show the values in data frame USA50.</p> <p>10. Using a suitable command, create a calculated column named Avg Reviews in Second_sheet by adding Reviews by Users and Reviews by Critics and divide it by 2. Display the first five rows of the Second_sheet after creating the previous calculated column.</p> <p>11. Using a suitable command, sort the Country values in ascending order (smallest to largest) and Avg_reviews in descending order (largest to smallest).</p>
<p><b>4</b></p>	<p>1. Create a data frame called df from the following tabular data dictionary that has these index labels: ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j'].</p>

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	<pre> Animal  Age  Priority  Visits a      cat  2.5      yes     1 b      cat  3.0      yes     3 c     snake  0.5      no      2 d      dog  NaN      yes     3 e      dog  5.0      no      2 f      cat  2.0      no      3 g     snake  4.5      no      1 h      cat  NaN      yes     1 i      dog  7.0      no      2 j      dog  3.0      no      1 </pre>
	<ol style="list-style-type: none"> <li>2. Display a summary of the data frame's basic information.</li> <li>3. Return the first three rows of the data frame df.</li> <li>4. Select just the animal and age columns from the data frame df.</li> <li>5. Count the visit priority per animal.</li> <li>6. Find the mean of the animals' ages.</li> <li>7. Display a summary of the data set.</li> <li>8. Return the first three rows of the data frame df.</li> <li>9. Extract first and last column in one table.</li> <li>10. Observe output of <code>ndim()</code>, <code>shape()</code></li> </ol>
<b>5</b>	<ol style="list-style-type: none"> <li>1. Create 500 random temperature readings for six cities over a season and then plot the generated data using Matplotlib.</li> <li>2. Load the well-known Iris data set, which lists measurements of petals and sepals of three iris species. Then plot the correlations between each pair using the <code>.pairplot()</code> method.</li> <li>3. Load the well-known Tips data set, which shows the number of tips received by restaurant staff based on various indicator data;</li> </ol>

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	<p>then plot the percentage of tips per bill according to staff gender.</p> <ol style="list-style-type: none"><li>4. Load the well-known Tips data set, which shows the number of tips received by restaurant staff based on various indicator data; then implement the factor plots to visualize the total bill per day according to staff gender.</li><li>5. Reimplement the above exercise using the Seaborn joint plot distributions.</li><li>6. Python program of Barplot with all parameters of a sample data.</li><li>7. Python program of Pie-chart with all parameters of a sample data.</li><li>8. Python program of Histogram with all parameters of a sample data.</li><li>9. Python program of Line Plot with all parameters of a sample data.</li><li>10. Python program of Scatter plot with all parameters of a sample data.</li></ol>
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**Requirement of Laboratory Support:**

Students need to install **Python Programming** tool using the following link :

<https://www.python.org/downloads/>

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- **Sem.** : 2
- **Subject Code** : 05MC0208
- **Subject** : C#.NET
- **Course Objectives:**
  1. To learn about the concept of modern, object oriented programming language using C#
  2. To understand the concepts of CLR and .Net Framework
  3. To understand and develop windows application using Microsoft Visual Studio.
  4. To update and enhance skills in writing Windows applications using ADO.NET
  5. To implement & develop real time application using C#.Net.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisites:** Basic knowledge of Object Oriented programming language.

Unit No	Topics Covered
<b>1</b>	<b>Introduction to .NET:</b> <ul style="list-style-type: none"> <li>• Core features of .NET, The building block of .NET platform (CLR,CTS,CLS), Understanding Common Type System, Understanding the Common Languages Specification, Understanding the Common Language Runtime, Assembly/Namespace/Type Distinction</li> </ul>

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	<p><b>Introduction to C#:</b></p> <ul style="list-style-type: none"> <li>• Different data types in C#, Literals, Scope of variables, type conversion in C#</li> <li>• <b>Operators:</b> Arithmetic, Relational, Logical, Bitwise ? operator</li> <li>• <b>Program Control statements:</b> if statement, switch statement, for statement, different types of loops.</li> </ul>
2	<ul style="list-style-type: none"> <li>• <b>Introducing to Classes and Objects:</b> Create class, objects, Methods, Constructors, Destructors, this keyword</li> <li>• <b>Object- Oriented Programming:</b> Member access and Inheritance, Constructor and Inheritance, Base class references and derived objects, Virtual methods and overriding, Abstract Classes, Boxing and Unboxing</li> <li>• Implementing Interface, Structures</li> <li>• Declaring and using Namespace, Preprocessor, Assemblies</li> </ul>
3	<p><b>Windows Programming</b></p> <p>How windows interacts with User, Windows Forms, Adding Button, Handling Messages, Using Message Box, Adding Menu</p>
4	<p><b>Database Programming with ADO.NET</b></p> <ul style="list-style-type: none"> <li>• Concept of Connected and Disconnected Architecture, understanding Data Provider, working with data reader, understanding database transaction.</li> <li>• understanding role of Dataset, DataRows, DataTables, Data Adapters,</li> <li>• Understanding the role of Entity Framework</li> </ul>
5	<p><b>Exception Handling Delegates and Events:</b></p> <ul style="list-style-type: none"> <li>• Using try and catch with example</li> <li>• Creating and using Delegates, Multicasting with Delegates. Multiple Event Handlers.</li> </ul> <p><b>Advanced in .NET:</b></p>

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	<ul style="list-style-type: none"> <li>• Understanding the Role of LINQ, Introduction to Windows Presentation Foundation (WPF), Window Communication Foundation and its Application</li> </ul>
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**Course Outcomes:**

1. Students will be able to understand C# and client-server concepts using .Net Framework Components.
2. Students will be able to get knowledge of object oriented programming and it's applications in C#.
3. Student will be able to develop windows applications using C#.NET.
4. Students will be able Develop effective database applications using ADO.NET
5. Student will be able to apply delegates, event and exception handling to incorporate with Win Form.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1			L			M			L		
CO2	L			M		L				H	
CO3	L							L			H
CO4		L			M		H				
CO5			M							L	

**Text Book :**

1. Pro C# 2010 and the ,Net 4 Platform, Andrew Troelsen, Apress, 5<sup>th</sup> Edition.
2. C# 2.0: The Complete Reference, Herbert Schildt, McGraw-Hill, 2<sup>nd</sup> Edition.

**Reference Books:**

1. Programming in C# A Primar, Balagurusamy, Tata McGrawHill, 3rd Edition.
2. C# 2010 for Programmers, Paul Deitel and Harvey Deitel, Pearson 4<sup>th</sup> Edition.
3. Pro C# 2008 and the .net 3.5 Platform, Troelsen, Andrew, Springer India Pvt. Ltd., 4th Edition.

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**Web References:**

1. <https://www.javatpoint.com/c-sharp-tutorial>
2. <https://dotnet.microsoft.com/learn/csharp>
3. <https://www.tutorialspoint.com/csharp/index.htm>
4. <https://dotnettutorials.net/course/csharp-dot-net-tutorials/>

**App References:**

1. Learn C#.Net , Sky Apper
2. C# Programming Compiler, Kappsmart
3. C# Corner, Mindcracker

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book 1: Chapter 1 Book 2: Chapter 3,4,5
2	Book 2: Chapter 6,11,12,16
3	Book 2: Chapter 26
4	Book 1: Chapter 21,22,23
5	Book 1 : 13,25 Book 2: 13,15

**PRACTICALS**

<b>Unit 1</b>
<ol style="list-style-type: none"> <li>1. Find the sum of all the elements present in a jagged array of 3 inner arrays.</li> <li>2. Find largest number from 3 numbers passed using command line argument.</li> <li>3. Write C# code to do the following - Convert binary to decimal - Convert decimal to hexadecimal - Convert decimal to binary - Convert decimal to octal.</li> <li>4. Write a C# code to Perform Celsius to Fahrenheit Conversion and Fahrenheit to Celsius conversion.</li> <li>5. Program to Check whether a number is Palindrome or not.</li> <li>6. Design a simple calculator using Switch Statement</li> </ol>

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7. Write C# code to display the asterisk pattern as shown below:  
\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*
8. Write C# code to prompt a user to input his/her name and country name and then the output will be shown as an example below: Hello Shyam from country India!
9. C# Program to Count the Number of 1's in the Entered Number
10. C# program to generate Random Numbers.

**Unit 2**

1. Define a class Student, which contains the following information about students: full name, course, subject, university, e-mail and phone\_number.
2. Add two methods in the class Student, which collect and display complete information about the student.
3. Define a class Mobile, which contains information about a mobile phone: model, manufacturer, price, owner, features of the battery (model, idletime and hours talk) and features of the screen (size and colors).
4. Add constructor for each of the Student and Mobile, which have different lists of parameters. Data fields that are unknown have to be initialized respectively with null or 0.
5. To the class of mobile phone in the previous two tasks, add a static field nokiaN95, which stores information about mobile phone model Nokia N95. Add a method to the same class, which displays information about this static field.
6. We have a school. In school we have classes and students. Each class has a number of teachers. Each teacher has a variety of disciplines taught. Students have a name and a unique number in the class. Classes have a unique text identifier. Disciplines have a name, number of lessons and number of exercises. Design different classes for school.
7. Define classes with their fields, properties, methods and constructors for school.
8. Design abstract class and abstract methods for School.
9. A company pays its employees on a weekly basis. The employees are of four types:

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- Salaried employees are paid a fixed weekly salary regardless of the number of hours worked
- Hourly employees are paid by the hour and receive overtime pay for all hours worked in excess of 40 hours
- Commission employees are paid a percentage of their sales
- Salaried-Commission employees receive a base salary plus a percentage of their sales.

For the current pay period, the company has decided to reward salaried-commission employees by adding 10% to their base salaries.

The company wants to implement a C# application that performs its payroll calculations polymorphic way.

- a. Design the class Diagram.
- b. Implement the code to fulfill the requirement.
- c. Calculation must be done with polymorphic way.

10. Demonstrate Use of Virtual and override key words in C# with a simple program.

11. Write a program to demonstrate Operator overloading.

**Unit 3**

1. Design a login page using textbox, label and Buttons.
2. Design Student's registration form using textbox, label, radio button.
3. Add listbox and check box in Students registration form.
4. Design Calculator using necessary components.
5. Creating the Customer Form that shows customers information like Customer\_Id, Email, Title, First name, Last name, Company, Address. Show necessary alter message when try to enter wrong detail.
6. Create three buttons each will display product information on their click event.

**Unit:4**

1. Consider the Database STUDENT consisting of following tables: tbl\_Course (CourseID: int, CourseName: string) tbl\_Student (Stud\_id int, Stud Name: string, Address: string, CourseID: int, YrOfAdmsn: int) Develop suitable windows application using C#.NET having following options:
  - Entering new course details.
  - Entering new student details.
  - Display the details of students who belong to a particular course.

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- Display the details of the students who have taken admission in a particular year
- 2. Consider the Database BLOODBANK consisting of following tables: tbl\_BloodGroup ( BloodID: int, BloodGroup: string) tbl\_Donor (DonorID: int, DonorName: string, Address: string, ContactNo: int, DOB: date, Gender: string, Weight: int, BloodID: int) Develop suitable windows application using C#.NET having following options:
  1. Entering Blood group details.
  2. Entering new donor details.
  3. Display the details of donors (in a Grid) having particular blood group.
  4. Display the details of donors based on gender
- 3. Consider the Database HOTEL develop suitable windows application using C#.NET having following options
  1. Entering order\_detail details.
  2. Create bill after conformation.
- 4. Consider the Database EMPLOYEE develop suitable windows application using C#.NET having following options
  1. Entering employee detail.
  2. Search a particular employee by name.
- 5. In above windows application add following options
  1. Delete a particular employee detail.
  2. Search employee by department.

**Unit:5**

1. Apply exception handling in STUDENT application (Unit 4(1)).
2. Apply exception handling in BLOODBANK application (Unit 4(2)).
3. Apply exception handling in EMPLOYEE application (Unit 4(4)).
4. Write a method ReadNumber(int start, int end) that reads an integer from the console in the range [start...end]. In case the input integer is not valid or it is not in the required range throw appropriate exception. Using this method, write a program that takes 10 integers a1, a2, ..., a10 such that  $1 < a_1 < \dots < a_{10} < 100$ .
5. Implement a program that takes as a parameter the name of a text file, read the file and returns its content as string. What should the method if and exception is thrown?
6. Write a program to demonstrate use of delegates.



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**Requirement of Laboratory Support:**

Students need to install Visual Studio for practical practice.

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- **Sem.** : 2
- **Subject Code** : 05SL0205
- **Subject** : Communication Skills
- **Course Objectives** : The objectives of this course are
  1. To enable students to enhance their communication skills with reference to workplace communication
  2. To enable students to draft various workplace related documents
  3. To make students aware of common errors and writing and speaking and ways to overcome them

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
1	3	6	5	5	11	30	NA	70

- **Prerequisites** :

Unit No	Topics Covered
<b>1</b>	<b>Communication at Workplace:</b> Attending and Conducting Meetings, Writing and Replying to Emails, Giving and Receiving Feedback, Giving and Receiving Suggestions
<b>2</b>	<b>Technical Writing:</b> Writing Reports and Managing Documentation, Writing Technical Product Descriptions, Writing Project Proposals, Common Errors in Writing and Speaking

**Course Outcomes:**

The course will enable students

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1. To apply their speaking skills for various contexts related to workplace communication
2. To create various workplace related documents in writing
3. To apply their English language skills for different professional purposes

Course Outcomes – Program Outcomes Mapping Table:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	-	-	-	-	-	-	3	-	-	-	-
CO2	-	-	-	-	-	-	2	-	-	1	-
CO3	-	-	-	-	-	-	2	-	1	1	-

**Text Book :**

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**Reference Books :**

1. *Technical Communication: Principals and Practice*, Meenaxi Raman and Sangita Sharma, Oxford Publication
2. *Technical Writing, Presentation Skills and Online Communication: Professional Tools and Insights*, Greenlaw Raymond, United Naval Academy, USA
3. *Business Communication Making Connections in a Digital World*, Lesikar Raymond, Marie E Flatley, Kathryn Rentz, NeerjaPande, MacGraw Hill, 2009
4. *Perfect Phrases for Office Professionals*, Meryl Runion and Susan Fenner, McGraw Hill, 2011

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	<i>Perfect Phrases for Office Professionals</i> - Meryl Runion and Susan Fenner
2	<i>Technical Communication: Principals and Practice</i> – Minaxi Raman and Sangita Sharma



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**Teaching Scheme**

**&**

**Syllabus**

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**MCA SEMESTER - 3**

Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0301	Software Engineering	5	15	30	25	25	55	30	70	NA
05MC0302	Cryptography	5	15	30	25	25	55	30	40	30
05MC0303	Artificial Intelligence	5	15	30	25	25	55	30	70	NA
05MC0304	Mini Project – 2	2	6	12	10	10	22	NA	NA	100
05MC0305	Electives - 2 Big Data Tools	4	12	24	20	20	44	30	NA	70
05MC0306	Machine Vision									
05MC0307	Machine Learning									
05MC0308	ASP.Net Programming									
05MC0309	MOOC – Cloud Computing	2	6	12	10	10	22	0	0	0
05CE0301	Corporate Etiquettes	1	3	6	5	5	11	30	NA	70
<b>Total</b>		<b>24</b>	<b>72</b>	<b>144</b>	<b>120</b>	<b>120</b>	<b>264</b>	<b>150</b>	<b>180</b>	<b>270</b>

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- **Sem.** : 3
- **Subject Code** : 05MC0301
- **Subject** : Software Engineering
- **Course Objectives** :
  1. To understand the concepts of various software Engineering Process Models.
  2. To analyze and understand user's requirements for development process.
  3. To understand how to Analyze, Design, Build an architecture of a software with attractive & effective user interface.
  4. To understand and implement various software testing techniques.
  5. To understand and create a various UML models to represent process flow of software in different point of view.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	70	NA

- **Prerequisites** : Knowledge of SDLS and Object Oriented Design Methodologies.

Unit No	Topics Covered
<b>1</b>	<b>Introduction to Software Engineering &amp; Process Models</b> Software Engineering, Software Process Process Models – Waterfall, Incremental, Evolutionary Process

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	<p>Model –          Prototype, Spiral and concurrent Development Model          Agile Process; Extreme Programming (XP); Brief          Overview of          Other Agile Process Models: Adaptive Software          Development,          Scrum, Dynamic Systems Development Method, Crystal,          Feature Driven Development, Lean Software          Development, Agile Modeling, Agile Unified Process</p>
<b>2</b>	<p><b>Requirement Engineering</b>          Requirements Engineering; Groundwork for          Understanding of          Software          Requirements; Overview of Eliciting Requirements,          Developing          Use Cases, Building the Requirements Model;          Negotiating          Requirements; Validating Requirements;          Requirement Modelling Strategies; Overview of Flow-          Oriented          Modelling, Behavioral Modelling;</p>
<b>3</b>	<p><b>Design Concepts</b>          Design Concepts, Design Model;          Architectural Styles, Architectural Design, Assessing          Alternative          architectural Designs, Architectural mapping Using Data          Flow          User Interface Design: Golden Rules of User Interface          Design;          User Interface Analysis and Design; Interface Analysis;          Interface Design steps          Webapp design: design quality, design tools, design          pyramid, WebApp interface design, Aesthetic design,          Content design, Architecture design, Navigation design</p>
<b>4</b>	<p><b>Software Testing</b>          Software; Test Strategies for Object Oriented Software;          Test          Strategies for WebApps; System Testing; Debugging;          Software Testing Fundamentals; White-Box Testing;          Basic Path Testing; Control Structure Testing; Black-Box</p>

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	Testing;
<b>5</b>	<b>High level design using UML</b> Diagrams, Class diagrams, Advanced classes, Advanced relationships, Object diagrams Interactions, Use cases, Use case diagrams, Interaction diagrams, Activity diagrams, Events and signals, State machines

**Course Outcomes :**

1. Student will understand various process models available for software engineering and its difference.
2. Students will be able to analyze and document the requirement specifications for a software project.
3. Students will be able to develop & design the process model using standard tools and methodologies with attractive user interface.
4. Students will be ensure about quality of the software by applying various testing technique after development of software.
5. Students will understand a high-level design with various UML diagrams.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	L				L		M		L		
CO2		L	M				L			H	
CO3	L			L		M					M
CO4		L			H			H			
CO5			M				H			H	

**Text Book :**

1. Software Engineering – A Practitioner’s Approach, Roger S. Pressman, McGraw Hill, 7th Edition,
2. Unified Modeling Language – User’s Guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Addison – Wesley , 2<sup>nd</sup> Edition

**Reference Books :**

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1. Software Engineering, Sommerville, Pearson Education, 8th Edition,
2. Software Engineering – A Precise Approach, Pankaj Jalote, Wiley India
3. Object Oriented Modeling and Design using UML, Michael Blaha and James Rumbaugh, Pearson Education, 2nd edition

**Web References :**

- 1) <https://nptel.ac.in/courses/106/101/106101061/>
- 2) <http://vlabs.iitkgp.ac.in/se/>

**App References :**

- 1) **Software Engineering, Softecks**
- 2) **Software Engineering, Engineering Apps**

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Book Number	Chapter Numbers
1	1	1.3,1.4, 2.1 to 2.3, 3.3, 3.4, 3.5
2	1	Ch - 5, 7.1 to 7.3
3	1	8.3, 8.4, 9.1.1, 9.3,9.4,9.5, 9.6, 11.1 to 11.4, 13.1 to 13.8
4	1	Ch-17, 18.1 to 18.6
5	2	7,8,9,10,14, 15,16,17,18,19,20,21

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- **Sem.** : 3
- **Subject Code** : 05MC0302
- **Subject** : Cryptography
- **Objectives** :
  - To understand the fundamentals of Cryptography
  - To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
  - To understand the various key distribution and management schemes.
  - To understand how to deploy encryption techniques to secure data in transit across data networks
  - To design security applications in the field of Information technology

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	40	30

- **Prerequisites** : Basic networking and numerical terms.

Unit No	Topics Covered
<b>1</b>	<b>Introduction</b> Computer Security Concepts, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security, Cryptography, Cryptology, Cryptoanalysis, Steganography, Substitution Techniques, Transposition Techniques.
<b>2</b>	<b>Symmetric and Asymmetric Key Cryptography</b> Semantic cipher model, Stream ciphers and block ciphers, Block Cipher structure, Feistel Cipher, Diffusion and Confusion, Data Encryption standard (DES) with example, strength of DES, Design principles of block cipher, AES, Multiple encryption and triple DES, Electronic Code Book,

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	<p>Cipher Block Chaining Mode, Cipher Feedback mode, Output Feedback mode, Counter mode, RC4 algorithm, Confidentiality using Symmetric encryption</p> <p><b>Public Key Cryptography:</b> Principles, RSA, Public Key Management, Diffie Hellman Key Exchange,</p>
<b>3</b>	<p><b>Authentication algorithm. Applications and Protocol:</b> Applications of Cryptographic Hash Functions, Two Simple Hash Functions, Requirements and Security, Hash Functions Based on Cipher Block Chaining. Secure Hash Algorithm (SHA), Digital Signatures, KERBEROS Protocol.</p>
<b>4</b>	<p><b>Network and Internet Security:</b> Transport Level Security: Web Security Issues, Secure Socket Layer(SSL), Transport Layer Security(TSL), HTTPS, E-Mail Security: PGP, S/MIME, Wireless Network Security: IEEE 802.11i Wireless LAN Security, Wireless Application Protocol Overview,</p>
<b>5</b>	<p><b>System Security:</b> Firewall: Introduction, types of firewalls, Firewall design principal, Intruder: Introduction, types of intruders, IDS and IPS, Differences between IDS and Firewall, Malicious Software: Virus and Worms, Virus Counter-Measures, DoS, DDoS attack</p>

▪ **Course Outcomes**

1. Analyze the concepts of cryptography security and their use.
2. Implement the principles of symmetric and asymmetric cryptography.
3. Understand and implement the message authentication code and its requirement.
4. Examine the different network and internet security structure using different protocols.
5. Analysis of system security mechanisms and the concept of malware technology and its impacts.

Course Outcomes – Program Outcomes Mapping Table :

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	M			H			L		L	M
CO2	H	M			H			M		L	H
CO3	H	L	M	L	H			L		M	H
CO4	M	M	L	L	H			L		M	H
CO5	M	H	M	L	M	L		M		M	M

- **Text Book :**

1. "Cryptography and Network Security – Principles and Practice", William Stallings, Pearson Education, 5<sup>th</sup> Edition.

- **Reference Books:**

1. "Applied Cryptography", Bruce Schneier, John Wiley, 2<sup>nd</sup> Edition.
2. "Cryptography & Network Security", Behrouz Forouzan, TMH, 1<sup>st</sup> Edition
3. "Handbook of Applied Cryptography", Menezes, Oorschot, Vanstone, CRC Press, 1<sup>st</sup> Edition.
4. "Cryptography: Theory and Practice", D Stinson, Chapman & Hall, 2<sup>nd</sup> Edition

- **Web References:**

1. <https://www.tutorialspoint.com/cryptography/>
2. <https://freevideolectures.com/course/3027/cryptography-and-network-security>
3. <https://nptel.ac.in/courses/106105031/>
4. <https://www.mepits.com/tutorial/413/basic-electronics/smart-cards>

app

- **App References:**

1. Cryptography-Collection of cipher and hashes
2. Crypto- Tools for Encryption & Cryptography

**Syllabus Coverage from text /reference book & web/app reference:**

Unit	Chapter Numbers
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1	Chapter 1: 1.1 to 1.6 and Chapter 2: 2.2 and 2.3
2	Chapter 2:2.1 Chapter 3: 3.1 to 3.5, Chapter 5:5.1 to 5.5 Chapter 6: 6.1 to 6.6, Chapter 7: 7.4 and 7.5, Chapter 9: 9.1, 9.2 and Chapter 10: 10.1
3	Chapter 11: 11.1 to 11.6, Chapter 13: 13.1, Chapter 15: 15.3
4	Chapter 16: 16.1,16.2, 16.3, Chapter 18: 18.1,18.2, Chapter 17: 17.1 to 17.3
5	Chapter 20,21 and 22

## PRACTICALS

**Note: Programming language for lab is Python/Java**

Sr. No.	List of Practical
<b>1</b>	1. Write a program that contains a string with a value "Hello World". The program should XOR each character in this string with 0 and displays the result. 2. Write program to implement Caesar cipher. 3. Write a program to implement 2x2 Hill cipher. 4. Write a program to implement Playfair cipher. 5. Write a program to implement Rail fence cipher.

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<b>2</b>	<ol style="list-style-type: none"><li>1. Write a program to implement encryption and decryption using DES algorithm in ECB, CBC and CFM mode. Take plain text and key from user.</li><li>2. Write a program to implement encryption and decryption using 3DES algorithm in ECB, CBC and CFM mode. Take plain text and key from user.</li><li>3. Write a program to implement encryption and decryption using AES algorithm in ECB, CBC and CFM mode. Take plain text and key from user.</li><li>4. Implement a stand-alone sender receiver program in which Sender encrypts a given text message entered from keyboard using RSA public key of Receiver and sends it to Receiver. Receiver Decrypts the ciphertext using his own RSA Private key and display the decrypted contents on screen. Use Appropriate package/Library for RSA.</li><li>5. Implement a stand-alone sender receiver program in which Sender encrypts a given text message entered from keyboard in a byte-by-byte manner using RC4 Stream Cipher and transmits it to receiver. Receiver Decrypts the ciphertext displays the decrypted contents on screen. Use Appropriate package/Library for RC4.</li></ol>
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<b>3</b>	<ol style="list-style-type: none"> <li>1. Implement a program which applies MD5 hashing on a given text message entered from keyboard. Display the hashed contents on screen and determine the size (in bits) of the output. Use appropriate Library/Package for MD5. Extend the above program to demonstrate the avalanche effect. This means, if message digest is applied for two different pieces of data, each of same size and differing by only 1 bit (say LSB), yet the corresponding message digest generated for each data are significantly different</li> <li>2. Implement SHA1 and 512 algorithms.</li> <li>3. Implement a program in which the user enters a password from keyboard. The program applies MD-5 hash on the entered password and stores it in a file. The program displays a message "Password hash stored". After this message, program prompts the user to re-enter the same password. When the user enters the password, the program computes the SHA-1 hash of the entered password. It then compares the SHA-1 hash of the entered password with the stored hash. If it is same, it displays the message "Successful" else displays a message "Error".</li> <li>4. Write a program for implementing Diffie Hellman key exchange algorithm.</li> <li>5. Implement steganography for hiding any kind of data using an image file.</li> </ol>
<b>4</b>	<ol style="list-style-type: none"> <li>1. Implement email encryption and decryption using PGP 4096-bit encryption.</li> <li>2. Create a Manu driven program for implementing DES, AES, RC4, RSA, Diffie Hellman, MD5 and SHA algorithm.</li> </ol>
<b>5</b>	<ol style="list-style-type: none"> <li>1. Prepare one script that behave like virus or worm.</li> <li>2. Perform DoS attack using LOIC tool.</li> <li>3. Prepare basic IDS system using SNORT tool.</li> </ol>

**Requirement of Laboratory support**

1. Students need to install **Python** tool using following link:

<https://www.python.org/downloads/>

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- **Sem.** : 3
- **Subject Code** : 05MC0303
- **Subject** : Artificial Intelligence
- **Course Objectives** :
  1. To equip with the basics of artificial intelligence and intelligent agents.
  2. To make aware about various search strategies.
  3. To understand knowledge representation and planning.
  4. To understand the concept of learning and neural networks.
  5. To acquire basic understanding of NLP, Robotics and Expert Systems.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
5	15	30	25	25	55	30	70	NA

- **Prerequisites** : Basic knowledge of Probability theory

Unit No	Topics Covered
<b>1</b>	<b>Introduction</b> Artificial Intelligence, Historical backdrop, What is intelligence?, The Turing test  <b>Intelligent agents</b> Introduction, How agents should act, Structure of intelligent agents, Environments
<b>2</b>	<b>Uninformed search strategies</b> Breadth first search, Depth first search, Depth Bounded search, Depth First Iterative deepening search  <b>Informed search strategies</b> Heuristic functions, Best first search, Hill climbing search, Iterative hill climbing, Simulated Annealing, Tabu search, Beam search, B & B

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	<p>search, A* search, IDA* search</p> <p><b>Game playing</b></p> <p>Games as search problems, Two person games, Minimax search, Alpha Beta pruning, Effectiveness</p>
<b>3</b>	<p><b>Knowledge representation</b></p> <p>Representations and mappings, Approaches to knowledge representation, Propositional logic, problems with propositional logic</p> <p><b>First order logic</b></p> <p>Syntax and semantics, Extension and notation variations, Using FOL, Inference – forward and backward chaining, Resolution, completeness of resolution</p> <p><b>Planning</b></p> <p>The STRIPS domain, Forward state space planning, Backward state space planning, Goal stack planning, Plan space planning</p>
<b>4</b>	<p><b>Learning</b></p> <p>A general model of learning agents, Inductive learning, learning decision trees</p> <p><b>Learning in neural and belief networks</b></p> <p>Neural networks, Perceptrons, Multilayer feed forward networks, Applications of neural networks</p>
<b>5</b>	<p><b>Natural language processing</b></p> <p>Classical problems in NLP, Basic NLP techniques, Applications, Natural language generation</p> <p><b>Robotics</b></p> <p>Introduction, Tasks, Parts, architectures</p> <p><b>Introduction to expert systems</b></p> <p>Introduction to KBES, Architecture of KBES, Case study of various KBES like MYCIN, MACSYMA, STEAMER, REACTOR</p>

**Course Outcomes:**

1. Student will be able to understand the concepts of artificial intelligence and intelligent agents.
2. Student will be able to apply search strategies.
3. Student will be able to understand knowledge representation, its approaches and planning.

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4. Student will be able to understand the concept of learning, neural networks and its applications.
5. Student will be able to understand NLP, Robotics and Expert Systems.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H			M	M			H	M	H	H
CO2	H	M		H	M			M	M	L	H
CO3	H	M	L	M	H			L	M	L	H
CO4	H	M		M	L			L	H	M	L
CO5	M	M	L	H	L	L		L	H	M	M

**Main Reference :**

1. “Artificial Intelligence – A Modern Approach”, Stuart Russell and Peter Norvig, 3<sup>rd</sup> Edition, Pearson Education
2. “Artificial Intelligence”, Elaine Rich and Kevin Knight, Shivashankar Nair, 3<sup>rd</sup> Edition, McGraw-Hill publication
3. “A First course in Artificial Intelligence”, Deepak Khemani, McGraw Hill Education
4. “Artificial Intelligence and Expert Systems for Engineers”, C. S. Krishnamoorthy, S. Rajeev, CRC press

**Reference Books :**

1. “Artificial Intelligence : A New Synthesis”, N. J. Nilsson, Elsevier India
2. “Artificial Intelligence”, G. F. Lugar, Pearson Education
3. “Artificial Intelligence – A Systems Approach”, M. Tim Jones, Infinity Science Press

**Web References :**

- 1) <https://intellipaat.com/blog/tutorial/artificial-intelligence-tutorial/>
- 2) <https://nptel.ac.in/courses/106/105/106105077/>

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**App References :**

- 1) Artificial Intelligence (AI) by SkedSoft
- 2) Artificial Intelligence Tutorial for Beginners by GZBapp

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Book Number	Chapter Numbers
1	1, 3	Book 1: 2.1,2.2,2.3,2.4, Book 3: 1.1 to 1.3
2	1, 3	Book 1: 5.1,5.2,5.4 Book 3: 2.3,2.4,2.7,2.8, 3.1 to 3.3, 3.7,3.8, 4.1,4.2, 5.2,5.5,5.7
3	1, 2, 3	Book 1: 7.1 to 7.3, 9.4,9.6,9.7 Book 2: 4.1 to 4.3 Book 3: 7.1 to 7.5
4	1	18.1 to 18.3, 19.1 to 19.5
5	1, 3, 4	Book 1: 25.1. to 25.4 Book 3: 16.1 to 16.4 Book 4: 3.2,3.3

**Practical List**

**Note:** The program can be implemented in any language as per the choice of the students. Preferred language is Python. Prolog can be used to design Rule based expert systems.

1. Implement Breadth First Search (for 8 puzzle problem).
2. Implement Breadth First Search (for Water Jug problem).
3. Implement Depth First Search (for 8 puzzle problem).
4. Implement Depth First Search (for Water Jug problem).
5. Write a program to solve Tower of Hanoi problem
6. Write a program to implement Single Player Game (Using Heuristic Function).
7. Implement Two Player Game - Tic-Tac-Toe (Using Heuristic Function).
8. Write a program to solve N-Queens problem.



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9. Write a program to solve travelling salesman problem.
10. Develop any Rule based system for an application of your choice.
11. Develop an Expert system for Medical diagnosis.

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- **Sem.** : 3
- **Subject Code** : 05MC0304
- **Subject** : Mini Project
- **Course Objectives** :
  1. To identify real world problem and analyze it.
  2. To know about project develop process with industry exposure.
  3. To gain knowledge about various phases of project development such as analysis, coding and testing.
  4. To develop skills of project documentation.
  5. To develop skills of latest technologies.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
2	6	12	10	10	22	30	NA	70

- **Prerequisites** : Concept of any Programming Language, Fundamentals of Software Engineering, knowledge of database.
- **Project guidelines** :
  - It is suggested to develop any web/desktop/Mobile application using emerging technologies (Based on elective subject of previous sem.)
  - Select project definition as per industry oriented.
  - Project team size should be of 2 to 3 students in each group.
  - Project definition concept should be unique.
  - This is user defined project so it may or may not be live project.
  - It is recommended to follow SDLC phase in development.

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- Coding standard should be followed properly with necessary comments.
- It is recommended to apply object oriented methodology in project development process with the concept of reusability of classes and packages, if it is applicable.
- Prepare appropriate test cases to test your algorithm and outcome of the project at the end of development process.
- Progress review will be evaluated periodically by assigned internal guide as per given milestone schedule.
- Documentation report will be prepared of project as per format.

**Documentation Report Format:**

<b>Chapters</b>	<b>Particulars</b>
<b>1</b>	<b>Synopsis</b>
<b>2</b>	<b>Preamble</b>
2.1	General introduction
2.2	Statement of problem
2.3	Objective of the study
2.4	Scope of the study
2.5	Methodology
2.6	Feasibility study
<b>3</b>	<b>Review of literature</b>
<b>4</b>	<b>Technical description</b>
4.1	Hardware requirement
4.2	Software requirement

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<b>5</b>	<b>System design and development (only applicable diagrams)</b>
5.1	Architectural design
5.2	Object modeling
5.2.1	Class diagram
5.3	Dynamic modeling
5.3.1	Use case diagram
5.3.2	Sequence diagram
5.3.3	Collaboration diagram
5.4	Database design
5.4.1	Table structure
5.4.2	Relationship diagram
5.5	Menu design
5.6	Screen design
<b>6</b>	<b>System testing</b>
6.1	Testing and implementation
6.2	Testing methodology
6.2.1	Unit testing
6.3	Validation checking
6.4	System implementation
6.5	Implementation procedure
<b>7</b>	<b>Conclusion</b>
<b>8</b>	<b>Learning during project work</b>
<b>9</b>	<b>Bibliography</b>
<b>9.1</b>	Online references
<b>9.2</b>	Offline references

**Course Outcomes :**

Students will be aware about overall project development process for giving real life problem solutions.

Students will learn about implementation of their knowledge of programming concepts.

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- **Sem.** :3
- **Subject Code** : 05MC0305
- **Subject** : Big Data Tools
- **Course Objectives** :
  1. To understand concept of big data and Hadoop.
  2. To implement HDFS commands and Map Reduce in Hadoop.
  3. To work with Hive.
  4. To work with Pig and Pig Latin.
  5. To understand the concept of Spark.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisite:** Knowledge of Big Data Fundamentals, NoSQL databases

Unit No	Topics Covered
<b>1</b>	<b>Introduction to Hadoop and Big Data:</b> Definition of Big data, characteristics of Big Data, Understanding Big data, Introducing Hadoop, Why Hadoop?, Why not RDBMS?, RDBMS versus Hadoop, Distributed Computing Challenges, History of Hadoop, Hadoop Overview, Use Case of Hadoop, Hadoop Distributors, HDFS (Hadoop Distributed File System) introduction, Processing Data with Hadoop, Managing Resources and Applications with Hadoop YARN (Yet another Resource Negotiator), Interacting with Hadoop Ecosystem

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<b>2</b>	<p><b>HDFS :</b> HDFS features, HDFS components, HDFS User Commands</p> <p><b>MapReduce</b> Introduction, Steps of Mapper and Reducer, MapReduce programming in Python example, Hadoop streaming, mrjob (installation, wordcount example)</p> <p><b>HBase :</b> Introduction, Architecture, Installation, shell, General commands, Admin API, Commands related to table (create, list, enable, disable, describe, alter, drop), Commands related to data (create, update, read, delete), Scan, Count, truncate</p>
<b>3</b>	<p><b>Hive</b> Introduction (What is HIVE?, HIVE Architecture, HIVE data Types, HIVE File Formats, HIVE query Language, RCFile implementation, Sharding, user-Defined Functions (UDF)</p>
<b>4</b>	<p><b>Pig :</b> Introduction( What is Pig? The anatomy of Pig, Pig on Hadoop, Pig philosophy, Use Case for Pig- ETL Processing, Pig Latin overview, Datatypes in Pig, running Pig, Execution modes of Pig, HDFS commands, Relational operators, Eval function, complex Data Types, Piggy Bank, User-Define Functions, Parameter substitution, Diagnostic Operator, Word Count Example using Pig, When to use and not use Pig, Pig at Yahoo, Pig vs HIVE</p>
<b>5</b>	<p><b>Spark :</b> Introduction to Data Analysis with Spark, Downloading Spark and Getting Started, Programming with RDDs</p>

**Course Outcomes : (Students will be able to)**

1. Understand fundamentals of Big Data and Hadoop.
2. Apply different commands of HDFS and MapReduce programming in Hadoop.
3. Understand the concept of Hive and Hive Query Language.
4. Develop Pig Script using Pig.
5. Understand fundamentals of Spark.

**Course Outcomes – Program Outcomes Mapping Table :**

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	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H		L	H				H		M
CO2	L	H							M		H
CO3	L	H							M		H
CO4	L	H							M		H
CO5	M	H							M		H

**Text Book :**

1. "Big Data and Analytics", Seema Acharya, Subhashini Chellappan Wiley India Pvt. Ltd.,2015, First Edition
2. Hadoop with Python",Zachary Radtka and Donald Miner,O'Reilly Media,2016, First Edition
3. "Learning Spark", MateiZaharia, Patrick Wendell, Andy Konwinski, Holden Karau,O'Reilly Media,2015, First Edition

**Reference Books :**

1. "Understanding Big Data : Analytics for Enterprise Class Hadoop and Streaming Data", Chris Eaton,Paul Zikopoulos,Tom Deutsch,George Lapis,Dirk DeroosMcgraw Hill Education (India)Pvt.Ltd.,2012, First Edition
2. "Hadoop: The Definitive Guide",Tom White,O'Reilly Media,,2015, 4th Edition
3. "Big Data - Black Book", Dt Editorial Services,Dreamtech Press,2016, First Edition

**Web References :**

1. <https://www.tutorialspoint.com/hbase>
2. <http://www.bigdatauniversity.com>

**App References :**

1. Learn Big Data Hadoop | Big Data Hadoop Tutorials, vrpmeCrazyTechEducation
2. Learn Apache Spark Offline, JustForYouLimitedEducation

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**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book 1 :Chapter - 5
2	Book 1 : Chapter – 5.10, Book 2 : Chapter – 2, Web Source : <a href="https://www.tutorialspoint.com/hbase">https://www.tutorialspoint.com/hbase</a>
3	Book 1 :Chapter–9
4	Book 1 :Chapter -10
5	Book 3:Chapter 1,2,3

## PRACTICALS

Unit No	List of Practicals
<b>1</b>	<p align="center"><b>HADOOP - HDFS</b></p> <p>HDFS Commands: -ls, -ls -R, -mkdir, -put, -get, -copyFromLocal, -copyToLocal, -cat, -cp, -rm-r</p> <p align="center"><b>HADOOP - MAPREDUCE</b></p> <ol style="list-style-type: none"> <li>Hadoop installation steps.</li> <li>Which path you need to set in hadoop-env?</li> <li>Properties setting in : <ol style="list-style-type: none"> <li>Core-site.xml</li> <li>Hdfs-site.xml</li> <li>Mapred.xml</li> <li>Yarn-site.xml</li> </ol> </li> <li>How to start and stop hadoop server?</li> <li>Which command is used to list the server names? Start all the servers and list the server names.</li> <li>Create a hello.txt file in local system and copy it into HDFS.</li> <li>Word count program – MapReduce – python code</li> <li>Vowels count program – MapReduce – python code</li> </ol> <p align="center"><b>HADOOP - HDFS</b></p>

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	CRUD operation on Emp – two column families – personalinfo and professionalinfo.																														
2	<p align="center"><b>HADOOP - HIVE</b></p> <p><b>Question : Write steps to start Hive.</b></p> <p><b>Ex – 1 :</b></p> <ol style="list-style-type: none"> <li>Create database Payroll</li> <li>Create Table Employee, Department</li> <li>Run DDL and DML commands</li> <li>Create table via loading data from files</li> <li>Create table form existing schema</li> <li>Run Data Retrieval queries , Joins, HIVEQL</li> </ol> <p><b>Ex – 2 :</b> word count using Hive</p> <p><b>Ex – 3 :</b> Create a partition table for customer schema to reward the customers based on their life time values.</p> <table border="1" data-bbox="479 1213 1502 1654"> <thead> <tr> <th>Custid</th> <th>Customers</th> <th>Life time values</th> </tr> </thead> <tbody> <tr><td>1001</td><td>Jack</td><td>25000</td></tr> <tr><td>1002</td><td>Smith</td><td>8000</td></tr> <tr><td>1003</td><td>David</td><td>12000</td></tr> <tr><td>1004</td><td>John</td><td>15000</td></tr> <tr><td>1005</td><td>Scott</td><td>12000</td></tr> <tr><td>1006</td><td>Joshi</td><td>28000</td></tr> <tr><td>1007</td><td>Ajay</td><td>12000</td></tr> <tr><td>1008</td><td>Vinay</td><td>30000</td></tr> <tr><td>1009</td><td>Joseph</td><td>21000</td></tr> </tbody> </table> <ol style="list-style-type: none"> <li>Create a partition table if life time value is 12000.</li> <li>Alter table and add new partition if life time value is 15000.</li> <li>Create a partition table for all life time values.</li> </ol>	Custid	Customers	Life time values	1001	Jack	25000	1002	Smith	8000	1003	David	12000	1004	John	15000	1005	Scott	12000	1006	Joshi	28000	1007	Ajay	12000	1008	Vinay	30000	1009	Joseph	21000
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	<p>Hint : for 1 and 2 – create static partition and for 3 – create dynamic partition.</p> <p><b>Ex – 3 :</b> Convert emp.xml file into structure format using Hive.</p>																														
<p align="center"><b>3</b></p>	<p align="center"><b>HADOOP - PIG</b></p> <p><b>Question : Write steps to start Pig.</b></p> <p><b>Ex – 1 :Create Movies.csv file</b></p> <ol style="list-style-type: none"> <li>Running Pig program in Local and MapReduce Mode</li> <li>Working with Pig Operators (FOREACH, ASSERT, FILTER, GROUP, ORDER BY, DISTINCT, JOIN, LIMIT, SAMPLE,SPLIT)</li> <li>Working with Pig functions</li> <li>Error handling in Pig</li> <li>Debugging in Pig</li> </ol> <p><b>Ex – 2 :</b> Pig script for word count</p> <p><b>Ex – 3 :</b> Write pig script to split customers for reward program based on their life time values.</p> <table border="1" data-bbox="479 1312 1502 1753"> <thead> <tr> <th>Custid</th> <th>Customers</th> <th>Life time values</th> </tr> </thead> <tbody> <tr><td>1001</td><td>Jack</td><td>25000</td></tr> <tr><td>1002</td><td>Smith</td><td>8000</td></tr> <tr><td>1003</td><td>David</td><td>12000</td></tr> <tr><td>1004</td><td>John</td><td>15000</td></tr> <tr><td>1005</td><td>Scott</td><td>12000</td></tr> <tr><td>1006</td><td>Joshi</td><td>28000</td></tr> <tr><td>1007</td><td>Ajay</td><td>12000</td></tr> <tr><td>1008</td><td>Vinay</td><td>30000</td></tr> <tr><td>1009</td><td>Joseph</td><td>21000</td></tr> </tbody> </table> <ul style="list-style-type: none"> <li>If life time value is &gt; 10000 and &lt;=20000 then silver program.</li> </ul>	Custid	Customers	Life time values	1001	Jack	25000	1002	Smith	8000	1003	David	12000	1004	John	15000	1005	Scott	12000	1006	Joshi	28000	1007	Ajay	12000	1008	Vinay	30000	1009	Joseph	21000
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	<ul style="list-style-type: none"><li>• If life time value is <math>&gt; 20000</math> then golden program.</li></ul>
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**Requirement of Laboratory support**

**1. Students need to install Hadoop, Pig, Spark tool using following link:**

**<https://www.python.org/downloads/>**

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- **Sem.** : 3
- **Subject Code** : 05MC0306
- **Subject** : Machine Vision
- **Course Objectives** :
  1. To understand the basic concepts and components of machine vision system.
  2. To study the problems associated with image acquisition and image analysis.
  3. To detect the various objects and shapes.
  4. To understand the automatic visual inspection of machine vision system.
  5. To discuss the design and development of machine vision system through case studies.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisite** : Knowledge of Image processing concepts

Unit No	Topics Covered
<b>1</b>	<b>Introduction and Components:</b> Machine Vision: Historical Perspective, Description of the Machine Vision Industry, Introductory concepts, components of machine vision, Camera Calibration, frame buffers and frame grabbers – digital and smart camera, sensors, charge coupled devices, Applications of machine vision

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<b>2</b>	<b>Image Acquisition, processing and decision-making:</b> Colour systems, Lighting system, image formation by lensing, image scanning, Processing of binary images, morphological operations – image analysis – factors extraction – decision making
<b>3</b>	<b>Shape Detection:</b> Boundary pattern analysis, Line detection, Circle and ellipse detection, Hough transform and Its nature
<b>4</b>	<b>Automated Visual Inspection:</b> Introduction, The process of inspection, The types of objects to be inspected, The main categories of inspection, Inspection of circular products, printed circuits, steel strip and wood inspection, X-Ray inspection, importance of color in inspection
<b>5</b>	<b>Case Studies:</b> Introduction, Location of Dark Contaminants in Cereals, Location of insects, High-speed Grain location, More recent development

**Course Outcomes:**

1. Students will be able to understand the basic machine vision techniques used in industries.
2. Students can extract useful information from image contents through processing and apply for decision making purpose.
3. Students will be able to apply machine vision concepts to various industries.
4. Students will be able to build sophisticated applications with collaboration of another technology.
5. Students will be able to apply the automatic visual inspection on industry problems.

**Course Outcomes – Program Outcomes Mapping Table:**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	M	L			M	M		L
CO2	H	H			M	L		M
CO3	M	H	M	M	M	L	L	L
CO4	M	H	L				L	H
CO5		M	L	L		M	M	

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**Text Book:**

1. Understanding and applying machine vision, Nello Zuech, Marcel Dekker, CRC Press, 2014, Second Edition
2. Machine Vision: Theory, Algorithms, Practicalities, E. R. Davies, Morgan Kaufmann Publication, 2005, Third Edition

**Reference Books:**

1. Image processing, Analysis, and Machine Vision, Milan Sonka, Vaclav Hlavac, Roger Bolye, Cengage Learning, 2015, Fourth Edition
2. Machine Vision, Ramesh Jain, Rangachar Kasturi, Brian G. Schunck, Tata McGrawHill Publication, 1995, First Edition
3. Machine Vision: Algorithms, Architectures and Systems, Herbert Freeman, Academic Press, 2012
4. Handbook on Machine Vision, Alexander Hornberg, Wiley Publication, 2006

**Web References:**

1. **URL 1**      [https://onlinecourses.nptel.ac.in/noc21\\_ee23/preview](https://onlinecourses.nptel.ac.in/noc21_ee23/preview)
2. **URL 2**      [https://onlinecourses.nptel.ac.in/noc19\\_cs58/preview](https://onlinecourses.nptel.ac.in/noc19_cs58/preview)

**App References:**

1. **APP 1**      <https://apps.apple.com/us/app/search-it/id1445511004>
2. **APP**        <https://apps.apple.com/us/app/cogniac/id1078465817>

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	TBook- 1 Ch 2,3,5,6
2	TBook - 1, Ch 6,7,8
3	TBook - 2, Ch 10,11,12,13
4	TBook - 2, Ch 20
5	TBook - 2, Ch 21

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**PRACTICAL**

<b>Unit no.</b>	<b>List of Practicals</b>
<b>1</b>	1) Installation of Python and Required image processing Libraries. 2) Use of camera and saving the image into digital format. 3) Display Existing image and properties captured through camera.
<b>2</b>	4) Image extraction, morphological operations 5) Image feature extraction 6) Identification of objects and its shapes 7) Bar code and QR code identification 8) Color values and edge identification in products. 9) Histogram values and analysis.
<b>3</b>	10) Shape identification from an image. 11) Applying Hough transformation into given image.
<b>4</b>	12) Inspection using RGB and grayscale values. 13) Inspection using segmentation method. 14) Identification of material through shading properties.
<b>5</b>	15) Dimension of an object 16) Template matching and Result Generation

**Requirement of Laboratory support**

1. Students need to install **Python** tool using following link:



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<https://www.python.org/downloads/>

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- **Sem.** : 3
- **Subject Code** : 05MC0307
- **Subject** : Machine Learning
- **Course Objectives** :
  1. To get the idea about concepts of machine learning and its applications
  2. To learn the concepts of feature engineering
  3. Understanding various algorithms of classification and regression for supervised machine learning
  4. Understanding various algorithms of clustering and association rule mining for unsupervised machine learning
  5. To learn the concepts of ANN, Deep learning - CNN and RNN

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisites** :

Unit No	Topics Covered
<b>1</b>	<b>Introduction to machine learning and preparing a model</b> Introduction, What is human learning? Types of machine learning, Applications of machine learning, Languages and tools in machine learning Machine learning activities, Basic types of data, Exploring data structure, Data quality and remediation, Data pre-processing
<b>2</b>	<b>Model selection and feature engineering</b>

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	<p>Introduction, Selecting a model, Training a model for supervised learning</p> <p>Features – understand your data better, Feature extraction and engineering, Feature engineering on – numerical data &amp; categorical data &amp; text data, Feature scaling, Feature selection, Dimensionality reduction</p>
<b>3</b>	<p><b>Supervised learning – Classification and Regression</b></p> <p>Example of supervised learning, Classification model, Classification learning steps</p> <p>Importance of Bayesian method, Bayes theorem and concept learning</p> <p>Common algorithms – K nearest neighbour (kNN), Decision tree, Random forest model, Support Vector Machine (SVM)</p> <p>Evaluating performance of classification models</p> <p>Introduction to regression, Example of regression, Common regression algorithms – Simple linear, Multiple linear, Main problems in regression analysis, Improving accuracy of linear regression model, Polynomial regression model, Logistic regression, Maximum likelihood estimation</p>
<b>4</b>	<p><b>Unsupervised learning</b></p> <p>Introduction, Unsupervised vs supervised learning, Applications, Clustering, Evaluating performance of clustering</p> <p>Finding pattern using association rule mining</p>
<b>5</b>	<p><b>Concepts of Neural network and Deep Learning</b></p> <p>Understanding biological NN, Exploring artificial Neuron, Types of activation functions, Early implementation of ANN, Architectures of NN, Learning process in ANN</p> <p>Deep learning, Recurrent neural networks – Introduction, Architecture, Challenges in training Recurrent NN, Applications of RNN, Convolutional neural networks – Introduction, Basic structure, Training CNN, Case studies -ZFNet, VGG, GoogLeNet, Applications of CNN</p>

**Course Outcomes: (Students will be able)**

1. To understand applications of ML in real life
2. To implement preprocessing steps on data to make it ready for analysis

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3. To apply classification and regression algorithms for supervised learning
4. To apply clustering algorithms and association rule mining algorithms for real life problems
5. To understand concepts of ANN along with Deep learning – RNN and CNN

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	H	H	M	L	H				H		M
CO2	L	H	L						M		H
CO3	L	H	H						M		H
CO4	L	H	H						M		H
CO5	H	H	L						M		H

**Text Book :**

1. "Machine Learning", SaikatDutt et al. , Pearson Education, 2019, Third Edition
2. "Practical Machine Learning with Python", Dipanjan Sarkar et al., Apress, 2018, First Edition
3. "Neural Networks and Deep Learning – A Textbook", Charu C. Aggarwal, Springer, 2018, First Edition

**Reference Books :**

- 1) "Machine Learning", Tom M Mitchell, McGraw Hill, First Edition
- 2) "Machine Learning", Anuradha Srinivasaraghavan, VincyJoseph, Wiley India, First Edition
- 3) "Machine Learning in Action", Peter Harrington, DreamTech, First Edition

**Web References :**

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1. [www.edx.org](http://www.edx.org)
2. [www.coursera.org](http://www.coursera.org)
3. [www.kaggle.com](http://www.kaggle.com)
4. [www.onlinecourses.nptel.ac.in](http://www.onlinecourses.nptel.ac.in)

**App References :**

1. Learn Machine Learning - ML Tutorials & Programs
2. Data Science 101 - Machine Learning Tutorials

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Book number	Chapter Numbers
1	1	1,2
2	1,2	Book 1 : 3.1,3.2,3.3 – Book 2 : 4
3	1	6.1,6.2,6.3,6.4, 7, 3.5.1, 3.5.2, 8
4	1	3.5.3,9, 10.1,10.2,10.3, 10.6, 10.9
5	1,3	Book 1: 10, Book 3: 7,8

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**PRACTICALS**

Unit No	List of Practicals																																													
<b>1&amp; 2</b>	<p><b>Data Identification and Feature Engineering :</b></p> <p><b>Practical – 1 :</b>Download Auto-MPG data set (<a href="https://www.kaggle.com/uciml/autompg-dataset">https://www.kaggle.com/uciml/autompg-dataset</a>) and perform following operations</p> <ol style="list-style-type: none"> <li>i. Write program to read dataset ( Text,CSV,JSON,XML)</li> <li>ii. Which of the attributes are numeric and which are categorical?</li> <li>iii. Performing Data Cleaning           <ul style="list-style-type: none"> <li>• Handling Missing Data</li> <li>• Removing Null data</li> </ul> </li> <li>iv. Rescaling Data</li> <li>v. Encoding Data</li> <li>vi. Feature Selection and Dimensionality Reduction           <ul style="list-style-type: none"> <li>• Implement Principle Component Analysis,</li> </ul> </li> </ol> <p><b>Practical – 2 :</b> Download Airline data set (<a href="https://www.kaggle.com/open-flights/airline-database">https://www.kaggle.com/open-flights/airline-database</a>) and perform all the above operations.</p>																																													
<b>3</b>	<p><b>Supervised Learning – Classification :</b></p> <p><b>Practical – 1 :</b>Write a python code to apply <b>Naive Bayesian</b> algorithm to classify that whether a person can buy computer or not based on given test data :</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th>Age</th> <th>Income</th> <th>Student</th> <th>Credit rating</th> <th>Buy computer</th> </tr> </thead> <tbody> <tr><td>Youth</td><td>High</td><td>No</td><td>Fair</td><td>No</td></tr> <tr><td>Youth</td><td>High</td><td>No</td><td>Excellent</td><td>No</td></tr> <tr><td>Middle</td><td>High</td><td>No</td><td>Fair</td><td>Yes</td></tr> <tr><td>Senior</td><td>Medium</td><td>No</td><td>Fair</td><td>Yes</td></tr> <tr><td>Senior</td><td>Low</td><td>Yes</td><td>Fair</td><td>Yes</td></tr> <tr><td>Middle</td><td>Low</td><td>Yes</td><td>Excellent</td><td>No</td></tr> <tr><td>Senior</td><td>Low</td><td>Yes</td><td>Excellent</td><td>Yes</td></tr> <tr><td>Youth</td><td>Medium</td><td>No</td><td>Fair</td><td>No</td></tr> </tbody> </table>	Age	Income	Student	Credit rating	Buy computer	Youth	High	No	Fair	No	Youth	High	No	Excellent	No	Middle	High	No	Fair	Yes	Senior	Medium	No	Fair	Yes	Senior	Low	Yes	Fair	Yes	Middle	Low	Yes	Excellent	No	Senior	Low	Yes	Excellent	Yes	Youth	Medium	No	Fair	No
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Youth	Low	Yes	Fair	Yes
Senior	Medium	Yes	Fair	Yes
Youth	Medium	Yes	Excellent	Yes
Middle	Medium	No	Excellent	Yes
Middle	High	Yes	Fair	Yes
Senior	Medium	No	Excellent	No

**Practical – 2** :Write a python code to implement **decision tree** for below given dataset. Identify Job offered or not.

CGPA	Communication	Aptitude	Programming_skill	Job_offered
High	Good	High	Good	Yes
Medium	Good	High	Good	Yes
Low	Bad	Low	Good	No
Low	Good	Low	Bad	No
High	Good	High	Bad	Yes
High	Good	High	Good	Yes
Medium	Bad	Low	Bad	No
Medium	Bad	Low	Good	No
High	Bad	High	Good	Yes
Medium	Good	High	Good	Yes
Low	Bad	High	Bad	No
Low	Bad	High	Bad	No
Medium	Good	High	Bad	Yes
Low	Good	Low	Good	No
High	Bad	Low	Bad	No
Medium	Bad	High	Good	No
High	Bad	Low	Bad	No
Medium	Good	High	Bad	Yes

**Practical – 3** : Write a python code to implement **K-nearest neighbourhood** program for the given dataset. (for above both the data sets)

**Practical – 4** :Implement supervised machine learning algorithm (Classification – K Nearest Neighbourhood) in python to classify breast tumour data into malignant breast

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	<p>tumour or benign breast tumour (use breast tumour dataset) and obtain its accuracy level.</p> <p><b>Practical – 5</b> :Implement supervised machine learning algorithm (Classification – K Nearest Neighbourhood) in python to classify iris data into setosa, virginica, versicolor using iris dataset and obtain its accuracy level.</p> <p><b>Practical – 6</b> :Build a classification model in python that classifies if a student gets admission in a course or not given his last two examination scores for the dataset available at <a href="https://docs.google.com/spreadsheets/d/1g0mjTUZ9Ado5prXA1UnAvNjmdzTrV0TzkFkIoU-Lpbk/edit?usp=sharing">https://docs.google.com/spreadsheets/d/1g0mjTUZ9Ado5prXA1UnAvNjmdzTrV0TzkFkIoU-Lpbk/edit?usp=sharing</a></p> <p><b>Practical – 7</b> :Implement supervised machine learning algorithm (Classification – Support VectorMachine) in python to classify breast tumour data into malignant breast tumour or benign breast tumour (use breast tumour dataset) and obtain its accuracy level.</p> <p><b>Practical – 8</b> :Write a python program to build an email spam classifier using support vector machines for the Spam base dataset from UCI machine learning repository.</p> <p><b>Practical – 9</b> : Implement supervised machine learning algorithm (Classification - Naïve Bayes algorithm) in python on Pima Indians Diabetes dataset and obtain its accuracy level.</p>												
4	<p><b>Supervised Learning – Regression :</b></p> <p><b>Practical – 1</b> :Predict the CPU time if the DiskIO = 40 on the basis of following data :</p> <table border="1" data-bbox="409 1619 740 1862"> <thead> <tr> <th>DiskIO</th> <th>CPUTime</th> </tr> </thead> <tbody> <tr> <td>14</td> <td>2</td> </tr> <tr> <td>16</td> <td>5</td> </tr> <tr> <td>27</td> <td>7</td> </tr> <tr> <td>42</td> <td>9</td> </tr> <tr> <td>39</td> <td>10</td> </tr> </tbody> </table>	DiskIO	CPUTime	14	2	16	5	27	7	42	9	39	10
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16	5												
27	7												
42	9												
39	10												

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	<table border="1"> <tr> <td>50</td> <td>13</td> </tr> <tr> <td>83</td> <td>20</td> </tr> </table>	50	13	83	20	<p><b>Practical – 2</b> :Write a python code to predict profit of hotel chain given the population of the area (city) using the data at <a href="https://docs.google.com/spreadsheets/d/1Ks20skBgEefHFU36sFqVzozoFtz2EZE2rxBIgXOrUg/edit?usp=sharing">https://docs.google.com/spreadsheets/d/1Ks20skBgEefHFU36sFqVzozoFtz2EZE2rxBIgXOrUg/edit?usp=sharing</a>.</p> <p><b>Practical – 3</b> : Write a python code to predict salary on the basis of experience in years using the data at <a href="https://github.com/tarunlnmiit/machine_learning/blob/master/SimpleLinearRegression.csv">https://github.com/tarunlnmiit/machine_learning/blob/master/SimpleLinearRegression.csv</a></p> <p><b>Practical – 4</b> : Write a python code to predict the price of house given square feet and number of bed rooms in the house for the dataset available at <a href="https://docs.google.com/spreadsheets/d/1DHVK7gKo4TSyj7mFLwofHamj1SI4SOZma2q51w1ZvyE/edit?usp=sharing">https://docs.google.com/spreadsheets/d/1DHVK7gKo4TSyj7mFLwofHamj1SI4SOZma2q51w1ZvyE/edit?usp=sharing</a></p> <p><b>Practical – 5</b> : Build a logistic regression model to classify flower type based on the dataset of iris flower.</p> <p><b>Practical – 6</b> :Build a multivariate logistic regression model to classify glass type of glass givendifferent glass mixture features using the Glass Identification Dataset from UCIMachine Learning Repository.</p>
50	13					
83	20					
<p><b>5</b></p>	<p><b>Unsupervised Learning – Clustering and Association Rule Mining :</b></p> <p><b>Practical – 1</b> :Implement unsupervised machine learning algorithm (Clustering – K Means) in pythonon Titanic dataset to cluster data (use Titanic dataset) by removing the class label.</p> <p><b>Practical – 2</b> :Implement unsupervised machine learning algorithm (Clustering – K Means) in python on Breast Tumour dataset to cluster data (use Breast Tumour dataset) by removing theclass label.</p>					

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**Practical – 3 :** Implement unsupervised machine learning algorithm (Clustering – Hierarchical) in python on Titanic dataset to cluster data (use Titanic dataset).

**Practical – 4 :** Implement unsupervised machine learning algorithm (Clustering – Hierarchical) in python on Breast Tumour dataset to cluster data (use Breast Tumour dataset) by removing the class label.

**Practical – 5 :** Implement Apriori algorithm in python to find rules which explain association between different products for given transactions at a retail store. (The data is available at <https://drive.google.com/file/d/1NUXoptUIHY8z4KcFKpFA6sQN5KnWzk3p/view?usp=sharing> )

**Practical – 6 :** Generating Association rule mining for following data set.

1	Red,White,Green
2	White,Orange
3	White,Blue
4	Red,White,Orange
5	Red,Blue
6	White,Blue
7	White,Orange
8	Red,White,Blue,Green
9	Red,White,Blue
10	Yellow

**Practical – 7 :** Generate Association rule mining for following data set.

1	Apple, Beer, Sugar, Chicken
2	Apple, Beer, Sugar
3	Apple, Beer
4	Apple, Peru
5	Milk, Beer, Sugar, Chicken
6	Milk, Beer, Sugar
7	Milk, Beer
8	Milk, Peru



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**Requirement of Laboratory support**

1. Students need to install **Python** tool using following link:

<https://www.python.org/downloads/>

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- **Sem.** : 3
- **Subject Code** : 05MC0308
- **Subject** : ASP.Net
- **Course Objectives** :
  1. To understand and gain knowledge about .Net framework.
  2. To learn and create web application development using ASP.Net
  3. To develop interaction of front end with database using facilities of ADO.NET platform
  4. To understand and implement various web controls.
  5. To learn and implement Web Service Architecture for web application development.

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
4	12	24	20	20	44	30	NA	70

- **Prerequisites** : Knowledge of basic web application development with object oriented concepts.

Unit No	Topics Covered
<b>1</b>	<b>Introduction of .Net Framework</b> <ul style="list-style-type: none"> <li>• Concept of .Net Programming Framework, CLR, .Net Class Library,</li> <li>• Data Types, Object Based Manipulation, Overview about Namespace,</li> <li>• APS.Net Applications : ASP.Net File Types, Various files behind the web applications, ASP.Net Configuration with web.config file.</li> </ul>
<b>2</b>	<b>Web form fundamentals with web controls</b>

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	<ul style="list-style-type: none"> <li>• Introduction of Web Controls :Basic web control classes and web control tags, Concept of AutoPostBack and Web control Events, How to access web controls.</li> <li>• Web controls : Basic Web controls, List Controls, Rich Controls, Validation Controls.</li> </ul>
<b>3</b>	<p><b>State Management &amp; Error Handling</b></p> <ul style="list-style-type: none"> <li>• Concept of Viewstate, Transferring Information, Custom Cookies, Session State and its configuration, Application State.</li> <li>• Overview of Common Error, .Net Exception object, Handling Exceptions, Throwing your own exception.</li> <li>• Managing User Interface Consistency : Concept of ASP.NET Master Page, Theme, Skins</li> </ul>
<b>4</b>	<p><b>Database Connectivity using ADO.Net &amp; Data Binding</b></p> <ul style="list-style-type: none"> <li>• Introduction of ADO.Net with Characteristics, ADO.Net Object Model,</li> <li>• SQL Basics with executing various SQL statements, Connection with database , accessing records and managing data base connectivity in web application.</li> <li>• Data Binding with ListControl Based controls,Tree View Control,Menu Control,GridView Control, DataList Control</li> </ul>
<b>5</b>	<p><b>Introduction of MVC, Ajax and Web services</b></p> <ul style="list-style-type: none"> <li>• Overview of The Model-View-Controller (MVC) Architecture, ASP.Net and MVC</li> <li>• Concept of AJAX, Overview of Client and server side support for AJAX.</li> <li>• Introduction of Web Service Architecture. Configuring a web services.</li> </ul>

**Course Outcomes :**

1. Students will be able to understand the architecture of Dot Net platform.
2. Students will be able to understand and create client server based application.
3. Students will be analyze and understand the transaction processing system and database connectivity.
4. Students will be able to understand and implements of Web services in web applications.

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5. Students will be able to understand about resources requirements and deployment of web applications.

Course Outcomes – Program Outcomes Mapping Table :

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1		L				L			M		
CO2			M		H			L			
CO3	L			M						L	H
CO4	L			L			M				
CO5		M			L			M		H	

**Text Book :**

1. ASP.Net The Complete Reference, Matthew MacDonald, Tata McGraw Hill Edition
2. Microsoft ASP.Net 4 Step by Step, George Shepherd, Microsoft Press

**Reference Books :**

1. Professional ASP .NET 2.0 , Alex Homer, Dave Sussman, and Rob Howard Wrox Publication
2. ASP.Net Tips, Tutorials and Code, Scott Mitchell, Steve Walther, Doug Seven, Donny Mack, Chis Payne, Techmedia Publication
3. Beginning .NET Web Services Using Visual Basic .NET, Joe Bustos and Karlli Watson, Wrox Publication
4. .NET – Complete Development Cycle, G. Lenz, T. Moeller, Pearson Education

**Web References :**

1. <http://www.tutorialspoint.com>
2. <http://www.microsoft.com/learning/en/us/certification/mcsd.aspx>
3. [https://www.w3schools.com/asp/asp\\_ajax.asp](https://www.w3schools.com/asp/asp_ajax.asp)
4. <https://docs.microsoft.com/en-us/aspnet/core/?view=aspnetcore-5.0>
5. <https://asp.net-tutorials.com/>

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**App References :**

1. Learn ASP.NET , Sky Apper
2. Learn ASP.Net Offline , JustForYouLimited
3. ASP.NET Tutorial Offline, Nestic

**Syllabus Coverage from text /reference book & web/app reference:**

Unit #	Chapter Numbers
1	Book – 1 Chapter : 1,2,5
2	Book – 1 Chapter : 7,27
3	Book – 1 Chapter : 10,11 Book – 2 Chapter : 7
4	Book – 1 Chapter : 12,13 Book – 2 Chapter : 10
5	Book – 2 Chapter : 22,23 Book – 1 Chapter : 18

**PRACTICALS**

**Unit : 1**

1. Prepare only GUI of Login screen with appropriate control.
2. Prepare only User interface design of Registration form.
3. Prepare only user interface design of contact us page.
4. Prepare only user interface design of your blog page.
5. Prepare only user interface of password change.

**Unit : 2**

1. In login screen, when user press login button then compare user id and password with static data and give appropriate message to user.
2. Design a web form of student admission form with appropriate controls. Also give proper validation in the form and when user presses submit button then it should be displays registration successful msg on screen.
3. Create a web form of students marksheet with appropriate validation as per below fields : Student Roll No, Name, Course, semester , email id , mobile number , Marks of five subjects, total, per , grade and result (Pass / Fail)When user input details up to marks and press submit button then on the next page, it should be displayed Roll No, Name, Result , Per , grade and result.
4. Create a web form of simple calculator with basic facility and validation.
5. Create a web form of billing which contains the following controls:  
 ListBox, Button , Image, Label, Text box or any other required control  
 The listbox is used to list items available in the hardware store. When the user clicks on an item in the listbox, its image is displayed in the image control & price in the label. Also entry quantity of that item in the text box and When the user clicks the button, the cost of the selected item is displayed in the label control.

**Unit : 3**

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1. Create a web page which illustrates the concept of cascading style sheets in ASP.NET.
2. Create a web page which illustrates the concept of Theme & Skin in ASP.NET
3. Design a simple web application home page to illustrate the concept of master page in ASP.NET
4. Develop a web page which implements the concept of state management using Cookies, Session and Application.
5. Create a web page to implement the concept of state management using ViewState and QueryString.
6. Create a web application which demonstrates the various tags in Web.config file for ASP.NET configuration.
7. Apply an appropriate exception handling in login page
8. Apply an appropriate exception handling in student Marksheet web portal.
9. Apply an appropriate exception handling in Calculator webpage.
10. Apply various theme on web page and change as per user selection.

**Unit : 4**

1. Create one user sign up form and store details in database. After that, compare user id and password of login screen using database connectivity.
2. Design a web form of student registration with appropriate fields. When student press submit button then all the details should be stored in database and generate user id (same as email) and password.
3. Design a web form of Password change with appropriate controls. When user enter user id and password then it should be compare from database , once it is successful then display appropriate msg .
4. Design a web form of Employee recruitment form with appropriate controls and Write a code of database connectivity (connection object), Fetching and inserting data from database (command object) and using Data Reader. Provide a of add , update , delete and search option button in the form.
5. Design a web form of Students marksheet with appropriate controls & Write a code to allow the admin to ADD, UPDATE, MODIFY, DELETE & SEARCH facility , once he has logged into the website using Bound and Unbound Controls.

**Unit : 5**

1. Implement the concept of AJAX in Student Marksheet project.
2. Implement the concept of AJAX in Employee Recruitment webportal.
3. Implement the concept of AJAX in Billing project.
4. Create a web form which implements the concept of Web services.
5. Create a web application which will use the data from other web portal using web services.

**Case Study**

Mini Project : Create a web application of Online MCQ base examination with appropriate facilities like students registration, list of subjects and questions entries



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,schedule a test with date and time limit, conduct exam and display result with correct ,incorrect and skip questions at the end of exam.

**Requirement of Laboratory support**

1. Students need to install **Visual Studio** tool using following link:

<https://www.python.org/downloads/>



- **Subject Code: 05CE0301**
- **Subject Name: Corporate Etiquettes**

**MCA AY – 2022-23 (Semester 3) (Marwadi University)**

**Objective:** This course shall enrich students’ corporate presence. They shall be able to communicate, connect and perform with confidence in corporate situations. Students shall have required skill-sets to demonstrate their compatibility in corporate world.

**Credits Earned:** 1 Credit

**Course Outcomes:** After successful completion of this course, student will be able to

- Understand and apply various corporate etiquettes
- Apply professional skills suited for corporate environment
- Analyse Campus Placement requirement
- Analyse and perform well in the Corporate Working Environment

**Teaching and Examination Scheme**

Delivery of Course and Examination Scheme								
Course Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
	Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
1	3	6	5	5	11	30	NA	70

**Contents:**

Unit	Topics (VA)	Contact Hours
1	Corporate Etiquette Basics	1
2	Greetings and Manners	1
3	Test Your Corporate Etiquette	1
4	Corporate Dress Code Etiquette	1
5	Corporate Grooming Standards	1
6	Corporate Dining Etiquette	1
7	Corporate E-mail & Telephone Etiquette	2
8	Networking and Social Media Etiquettes	2
9	Effective Communication	2



10	Job Interview Etiquette	2
11	Group Discussion Etiquettes	2
12	Seven habits of Highly effective People	2
13	Thinking Skills : Critical Thinking	2
14	Thinking Skills : Creative Thinking	2
15	Goal Settings	2
16	Time Management	2
17	Self Analysis and Personality Test	2
18	Stress Management	2
<b>Total Hours</b>		<b>30</b>

**References:**

1. The Seven Habits of Highly effective People By Stephen Covey
2. Eat that Frog By Brian Tracy

**Suggested Theory distribution:**

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
20%	20%	30%	15%	10%	5%

**Instructional Method:**

- a. The course delivery method will depend upon the requirement of content and need of students. The trainer shall train students through interactions, demonstration, brainstorming, group tasks etc.
- b. Students will use supplementary resources such as online videos and books.

**Mr. Dhananjay Singh**  
**Assistant Vice-President-L&D**



**Marwadi**  
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**Syllabus for Faculty of Computer Application**

**Master of Computer Application**



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# **Faculty of Computer Applications**

**Master of Computer Applications**

**MCA Sem - 4**

**Teaching Scheme**

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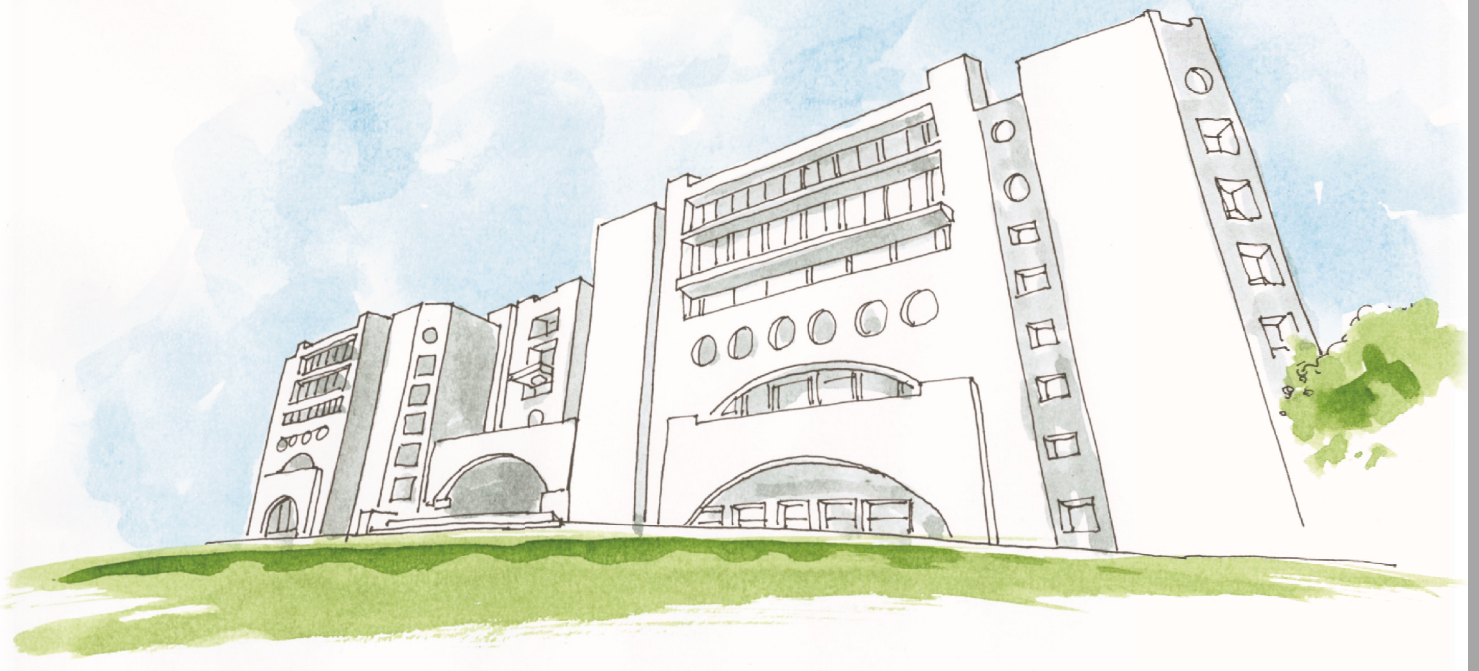
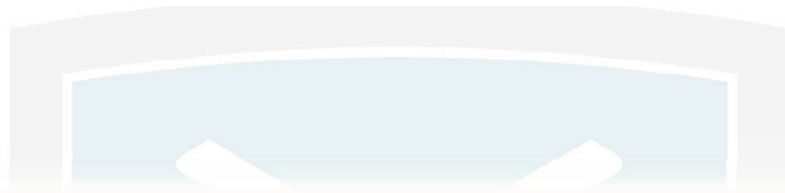
**MCA SEMESTER - 4**

MCA (MASTERS OF COMPUTER APPLICATIONS) Course Details : Sem - 4										
Subject Code	Subject Name	Credits	No of Interactive Sessions		Hours of Study Material			Examination Scheme		
			Interactive Live Lectures	Discussion Forum	e-Tutorials in Hours	e-Contents Hours	Self-study & Assessment Hrs	CSE	ESE	ETP
05MC0401	Industry Defined Project (Internship)	20	NA	NA	NA	NA	NA	NA	NA	100
	<b>Total</b>	<b>20</b>						<b>0</b>	<b>0</b>	<b>100</b>



**Marwadi**  
University  
Marwadi Chandarana Group

NAAC



Rajkot-Morbi Highway, Rajkot-360003, Gujarat, India  
[www.marwadiuniversity.ac.in](http://www.marwadiuniversity.ac.in)

For Admission Enquiries, Call or WhatsApp:  
 **8980030090**

Scan for 360°  
Campus View

