SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
MCA   DEPARTMENT

ACADEMIC REGULATIONS-2024
COURSE STRUCTURE
AND
SYLLABI
OF

MASTER OF COMPUTER APPLICATIONS

INSTITUTE VISION

To emerge as a Centre of Excellence for Learning and Research in the

domains of engineering, computing and management.

INSTITUTE MISSION

- Provide congenial academic ambience with state-art of resources for
  learning and research.

- Ignite the students to acquire self-reliance in the latest technologies.

- Unleash and encourage the innate potential and creativity of students.

- Inculcate confidence to face and experience new challenges.

- Foster enterprising spirit among students.

- Work collaboratively with technical Institutes / Universities / Industries of
  National and International repute.

DEPARTMENT VISION

To become the Centre of excellence for skilled software professionals in Computer Applications.

DEPARTMENT MISSION

- Provide congenial academic ambiance with necessary infrastructure and learning resources.
- Inculcate confidence to face and experience new challenge from industry and society
- Ignite the students to acquire self reliance in the State-of-the Art Technologies.
- Foster Enterprise spirit among students

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Graduates of Computer Applications shall

Programme Education Objectives of the department	
PEO1	Have Professional competency through the application of knowledge gained from fundamental and advanced concepts of structural and functional components in software. (**Professional Competency**)
PEO2	Excel in one's career by critical thinking toward successful services and growth of the organization or as an entrepreneur or through higher studies. (**Successful Career Goals**)
PEO3	Enhance Knowledge by updating advanced technological concepts for facing the rapidly changing world and contribute to society through innovation and creativity. (**Continuing Education to Society**)

PROGRAMME OUTCOMES (PO's)

Computer Applications Graduates will be able to

PROGRAMME OUTCOMES (PO's)	
PO1	**Foundation Knowledge:** Apply knowledge of mathematics, programming logic and coding fundamentals for solution architecture and problem solving.
PO2	**Problem Analysis:** Identify, review, formulate and analyse problems for primarily focussing on customer requirements using critical thinking frameworks.
PO3	**Development of Solutions:** Design, develop and investigate problems with as an innovative approach for solutions incorporating ESG/SDG goals.
PO4	**Modern Tool Usage:** Select, adapt and apply modern computational tools such as development of algorithms with an understanding of the limitations including human biases.
PO5	**Individual and Teamwork:** Function and communicate effectively as an individual or a team leader in diverse and multidisciplinary groups. Use methodologies such as agile.
PO6	**Project Management and Finance:** Use the principles of project management such as scheduling, work breakdown structure and be conversant with the principles of Finance for profitable project management.
PO7	**Ethics:** Commit to professional ethics in managing software projects with financial aspects. Learn to use new technologies for cyber security and insulate customers from malware
PO8	**Life-long learning:** Change management skills and the ability to learn, keep up with contemporary technologies and ways of working.

ACADEMIC REGULATIONS FOR MCA

(EFFECTIVE FOR THE STUDENTS ADMITTED INTO THE ACADEMIC YEAR 2024-25)

1. ELIGIBILITY FOR ADMISSION

1.1 Admission to the MCA program shall be made subject to the eligibility, qualifications and specialization prescribed by the A.P. State Government/University for each program, from time to time.

1.2 Admissions shall be made on the basis of either the merit rank or Percentile obtained by the qualified student in the relevant qualifying Examination / the merit rank obtained by the qualified student in an entrance test conducted by A.P. State Government (APICET) for MCA programs/an entrance test conducted by university/ on the basis of any other exams approved by the University, subject to reservations as laid down by the Govt. from time to time.

2. AWARD OF DEGREE

A student will be declared eligible for the award of the MCA degree if he/she fulfils the following:

2.1 Pursues a course of study for not less than two academic years and not more than four academic years.

2.2 Register for 102 credits and secure all 102 credits.

2.3 Students, who fail to fulfil all the academic requirements for the award of the degree within four academic years from the year of their admission, shall forfeit their seat in MCA program and their admission stands cancelled.

3. PROGRAM RELATED TERMS

3.1 **Credit:** A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (Lecture/Tutorial) or two hours of practical work/field work per week.

Credit definition:

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit

3.2 **Academic Year:** Two consecutive (one odd + one even) semesters constitute one academic year.

3.3 **Choice Based Credit System (CBCS):** The CBCS provides choice for students to select from the prescribed courses.

4. PROGRAM PATTERN

4.1 Total duration of the of MCA program is two academic years

4.2 Each academic year of study is divided into two semesters.

4.3 Each Semester shall be of 22 weeks duration (inclusive of Examinations), with a minimum of 90 instructional days per Semester.

4.4 The student shall not take more than four academic years to fulfill all the academic requirements for the award of MCA degree from the date of commencement of first year first semester, failing which the student shall forfeit the seat in MCA program.

4.5 The medium of instruction of the program (including examinations and project reports) will be in English only.

4.6 All subjects/courses offered for the MCA program are broadly classified as follows:

S.No	Broad Course Classification	Course Group Category	Course Description
1	Core Courses	PC – Professional Core	Includes core subjects related to the parent discipline of MCA.
		MOOC	Online courses which include the courses concerned to the MCA.
2	Elective Courses	PE - Professional Electives	Includes electives subjects related to the parent discipline department of Computer Applications
		OE- Open Electives	Elective subjects which include inter-disciplinary subjects or subjects in an area outside the parent discipline which are of importance in the context of special skill development
3	Employability Enhancement Courses	SEC- Skill Enhancement Course	Student Skill Enhancement Courses, which includes technical skills
		PW - Project Work	Major project work
		Industrial training	Industrial Internship / Industrial visit

4.7 Departments shall take measures to implement Virtual Labs (https://www.vlab.co.in) which provide remote access to labs in various disciplines of Engineering and will help student in learning basic and advanced concept through remote experimentation. Student shall be made to work on virtual lab experiments during the regular labs.

4.8 Institution shall assign a faculty mentor after admission to a group of students from same department to provide guidance in courses registration / career growth / placements / opportunities studies / other competitive exams etc.

4.9 The entire course work for MCA is of four semesters (I, II, III & IV semesters), the Contact periods/ credits and marks as follows.

Table 1: Contact Periods/ Credits and Marks

Particulars	Semester				
	Periods/week	Credits	Internal Marks	External Marks	Total Marks
Theory	04	04	40	60	100
Electives	03	03	40	60	100
Practical	03	02	40	60	100
SOC Course	03	02	40	60	100
MOOCs course	--	02	-	-	-
Project Work	--	10	40	60	100

4.10 The course pattern and total credits as follows.

Table 2: Course Pattern and Total Credits

Semester	Theory Courses	Practical Courses	SOC Courses	Non-Credit Courses	Credit Distribution	Total credits
I	05	03	01	--	5x4+2x3+2=28	28
II	05 & MOOC	03	01	01	3x4+2x3+3x2+2+2=28	28
III	05	03	01	01	3x4+2x3+3x2+2+=26	26
IV	02	0	01	--	2x4+2 = 10	10
IV	Project Work				10	10
				Total Credits		102

5. ATTENDANCE REQUIREMENTS

5.1 A student shall be eligible to appear for end semester examinations, if he/ she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester.

5.2 A student shall be eligible to appear for the external examinations if he/she acquires a minimum of 50% attendance in each subject and minimum of 75% of attendance in aggregate of all the subjects.

5.3 Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester may be granted by the College Academic Committee.

5.4 Shortage of attendance below 65% in aggregate shall in NO case be condoned.

5.5 Condonation of shortage of attendance shall be granted only on genuine and valid reasons on representation by the candidate with supporting evidence. A stipulated fee shall be payable towards condonation of shortage of attendance.

5.6 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end semester examination of that class and their registration shall stand cancelled.

5.7 A student will not be promoted to the next semester unless he satisfies the attendance requirements of the present semester. They may seek re-admission into that semester when offered next.

6. DISTRIBUTION AND WEIGHTAGE OF MARKS

6.1 The performance of a student in each semester shall be evaluated subject - wise (irrespective of credits assigned), for a maximum of 100 marks for theory and 100 marks for practical and project, on the basis of Internal Evaluation and End Semester Examination.

6.2 A student has to secure not less than 40% of marks in the end examination and a minimum of 50% of marks in the sum total of the internal examination and end semester examination marks taken together for the theory, practical, skill courses, projects etc. In case of a mandatory audit course, he/she should secure 50% of the total internal marks.

6.2 There shall be five units in each of the theory subjects. For the theory subjects 60% of the marks will be for the End Semester Examination and 40% of the marks will be for Internal Evaluation.

6.3 For practical subjects including skill-oriented courses and project work the distribution shall be 40 marks for Internal Evaluation and 60 marks for the End Semester Examination.

7. INTERNAL EXAMINATIONS

7.1 For theory subjects including mandatory audit courses, during the semester, there shall be two Internal (Mid-term) examinations, each internal examination consists of 20 Multiple Choice Questions (MCQ) for 10 marks (The objective paper shall be prepared in line with the quality of competitive examinations questions) with each question carries 0.5 marks and descriptive paper consists of 05 questions, out of which student has to answer 3 questions for 30 marks. Each internal examination will be conducted for 40 marks for 2 hours duration.

7.2 The objective paper shall be conducted either online or offline by the respective institution on the day of subjective paper test.

7.3 First Mid-Term examination shall be conducted in Units-I, II and half of III unit and Second Mid-Term examination shall be conducted for balance of half of III unit, IV and V units.

7.4 Final Internal marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weightage to the better mid exam marks and 20% to the other.

7.5 If the student is absent for any one of the midterm examination, the final internal marks shall be arrived at by considering 80% Weightage to the marks secured by the student in the appeared examination and zero to the other.

7.6 For practical courses including skill-oriented courses, the internal evaluation based on the day-to-day work, record submission and viva-voce, all together for 20 marks and the remaining 20 marks to be awarded by conducting an internal practical exam at the last week of the semester.

7.7 Project work internal evaluation is 40 marks based on the conduction of internal reviews including zeroth/abstract review.

7.8 If there is any fraction in the marks secured by the student in any subject in the Internal examination, then it will be rounded off to the next highest digit.

8. EXTERNAL EXAMINATION

The following pattern shall be followed in the End Semester Examinations:

8.1 For theory courses, there shall be two parts, Part-A and Part-B, Part-A (Qn 1 to 5) shall contain 5 short answer questions (without choice) for a total of 10 marks such that each question carries 2 marks. Part-B (Qn 6 to 15) shall contain 5 descriptive answer questions of equal credence with internal choice for a total of 50 marks such that each question carries 10 marks. All questions have to be answered compulsory. Each question may consist of one, two or more sub questions. The questions shall be set by covering one unit of the syllabus for each question. The total time duration to answer Part-A and Part-B is 3 hours.

8.2 For practical courses including skill-oriented courses, the end semester examination shall be evaluated for 60 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department appointed by the Chief superintendent, with a breakup mark of Procedure-10, Experimentation-25, Results/Execution-15, Viva- Voce-10.

8.3 The Project work shall be initiated at the beginning of the IV Semester and the duration of the Project work is for one semester. Evaluation of Project work is for 100 marks with 40 marks for internal evaluation and 60 marks for external evaluation.

8.4 There shall be no external examination for mandatory courses with zero credits.

8.5 A student eligible to appear for the end examination in a subject but absent for it or has failed in the external examination may appear for that subject at the next supplementary examination offered.

9. MANDATORY AUDIT COURSES

9.1 Courses like Universal Human Values and Design Thinking and Innovation offered as non-credit mandatory courses for all the MCA students.

9.2 The Internal Marks will be calculated similar to that of Theory course.

9.3 There shall be no external examination for mandatory courses with zero credits. However, attendance shall be considered while calculating aggregate attendance and student shall be declared to have passed the mandatory course only when he/she secures 50% or more in the internal examinations. In case, the student fails, a re-examination shall be conducted for failed candidates for 40 marks, when the courses offered/sub-sequent semester.

9.4 Re-exam shall be conducted for failed candidates for every semester at a mutual convenient date of institution.

9.5 In grade sheet the completion of the course indicated as Pass – "P", and No marks or no letter grade shall be allotted, for all non-credit mandatory audit courses.

10. SKILL ORIENTED COURSES

10.1 There shall be four skill-oriented courses offered during I to IV semesters.

10.2 For skill-oriented courses internal and external evaluation is in line with regular practical courses based on the day-to-day work, record submission and viva-voce for 20 marks and the remaining 20 marks to be awarded by conducting an internal practical exam at the last week of the semester. The end semester examination shall be evaluated for 60 marks, conducted by the concerned laboratory teacher and a senior expert in the subject from the same department appointed by the Chief superintendent, with a breakup mark of Procedure-10, Experimentation-25, Results/Execution-15, Viva- Voce-10.

10.3 The student shall be given an option to choose either the skill courses being offered by the college or to choose a certificate course being offered by Industries/Professional bodies or any other accredited bodies. If a student chooses to take a Certificate Course offered by external agencies, the credits shall be awarded to the student upon producing the Course Completion Certificate from the agency.

10.4 A committee shall be formed at the level of the college to evaluate the grades/marks given for a course by external agencies and convert to the equivalent marks/grades.

10.5 The recommended courses offered by external agencies, conversions and appropriate grades/marks are to be approved by the Board of Studies-MCA.

10.6 If a student prefers to take a certificate course offered by external agency, the department shall mark attendance of the student for the remaining courses in that semester excluding the skill course in all the calculations of mandatory attendance requirements upon producing a valid certificate as approved by the Board of Studies-MCA.

11. MASSIVE OPEN ONLINE COURSE'S (MOOC'S)

11.1 The college in line with the developments in Learning Management Systems (LMS) intends to encourage the students to do online courses in MOOCs, offered nationally/ internationally. The main intension to introduce MOOCs is to obtain enough exposure through online tutorials, self-learning at one's own pace, attempt quizzes, discussion with professors from various universities and finally to obtain certificate of completion of the course from the MOOCs providers.

11.2 A Student has to pursue and complete one course compulsorily through MOOCs approved by the Institution. A student can pursue courses other than core through MOOCs and it is mandatory to complete one course successfully through MOOCs for awarding the degree. A student is not permitted to register and pursue core courses through MOOCs. Students may be permitted to register one online (which is provided with certificate) in I year I semester and they should produce the course completion certificate of that course on or before the commencement of IV semester to the controller of examinations to become eligible for fulfillment of the degree.

11.3 Institution may provide a list of standard MOOCs providers whose credentials are endorsed by the Board of Studies. A student shall register for the course (Minimum of either 8 weeks or 12 weeks) offered through MOOCs with the approval of Head of the Department. The HOD shall appoint one mentor to monitor the student's progression. The student needs to earn a certificate by passing the exam. The student shall be awarded the credits assigned in the curriculum only by submission of the certificate. Examination fee, if any, will be borne by the student.

11.4 Students who have qualified in the proctored examinations conducted through MOOCs platform can apply for credit transfer as specified and are exempted from appearing internal as well as external examination (for the specified equivalent credit course only) conducted.

11.5 Student registration for the MOOCs shall be only through the department/institution, it will be mandatory for the student to share necessary information with the institution.

11.6 The department/institution shall notify at the beginning of semester the list of the online learning courses eligible for credit transfer in the forthcoming Semester. The department/institution shall also ensure that the student has to complete the course and produce the course completion certificate as per the academic schedule given for the regular courses in that semester.

11.7 The award of grades to the MOOC course is with the following normalization to the marks of students, who have completed MOOC course through proctored and non-proctored examination.

11.8 Proctored Examination: If a student completed MOOC course under Proctored examination, then the marks awarded will be normalized as follows

<p align="center">Normalization Formula Y=X*1.25</p>

Where X is marks obtained in the Proctored examination

Y is Marks obtained after normalization

If the value of Y (normalized marks) exceeds 100 then it will be considered as 100 only

11.9 Non-Proctored Examination: If the student completed MOOC course under non-Proctored exam, then only 'Pass Grade' will be awarded.

12. EVALUATION OF PROJECT WORK / DISSERTATION

12.1 Evaluation of Project work is for 100 marks with 40 marks for internal evaluation (conduction of periodical reviews) and 60 marks for external evaluation (conduction of external viva-voce). The evaluation of the project is done based on the rubrics designed for that curriculum component.

12.2 A Project Review Committee (PRC) shall be constituted with the Head of the Department as Chairperson, Project Supervisor and one senior faculty member of the department offering the MCA program.

12.3 The Project work shall be initiated in the IV semester and the duration of the Project is of one semester. Every candidate shall be required to submit thesis/ dissertation after taking up a topic approved by the Project Review Committee (PRC).

12.4 A candidate is permitted to register for the Project Work in III Semester after satisfying the attendance requirement in all the subjects, both theory and laboratory (in I & II semesters).

12.5 A candidate has to submit the title, objective and plan of action of his/ her Project Work to the PRC for its approval in consultation with the Project Supervisor and after approval only the Project Work can be started.

12.6 The PRC continuously monitors and evaluates the progress of the Project Work by conducting three reviews including abstract review during the project period, during the project review meetings, individual contributions are monitored to assess individual the performance.

12.7 If a candidate wishes to change his /her supervisor or topic of the project he/ she can do so with an approval of PRC. However, the PRC shall examine whether the change of topic/ supervisor leads to a major change of his/ her initial plans of project proposal. If so, his / her date of registration for the Project Work starts from the date of change of supervisor/ topic as in the case may be.

12.8 At the end of the semester the candidate shall submit a project report (draft copy) on the work carried out during the project work for the approval of PRC to the Head of the Department and make an oral presentation before the PRC.

12.9 After approval from the PRC, a soft copy of the project report / thesis should be submitted for Anti- Plagiarism check and the plagiarism report should be included in the final thesis. The Thesis will be accepted for submission, if the similarity index is less than 30%.

12.10 After successful plagiarism check, three copies of the Project report/thesis certified by the supervisor and HOD shall be submitted to the College.

12.11 The HOD shall submit a panel of five examiners as submitted by the supervisor concerned for a maximum of 20 students. The principal shall nominate external examiner for conducting Project viva voce examination.

12.12 The Head of the Department shall coordinate and make arrangements for the conduct of Project Viva-Voce examination. The final viva-voce shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the principal at the end of the Semester.

12.13 The distribution of marks for the Internal assessment and End Semester Project Viva-Voce Examination is given below:

Internal Assessment (40 Marks)			End Semester Examination (60 Marks)		
Review-I	Review-II	Review-III	Supervisor	Internal Examiner	External Examiner
10	15	15	20	20	20

12.14 The candidate has to secure a minimum of 50% marks in Project Work Viva-Voce examination. If he fails to fulfill the requirements as specified, he will reappear for the Project Viva-Voce examination only after three months. In the reappeared examination also, if he fails to fulfill the requirements, he will not be eligible for the award of the degree.

13. PROFESSIONAL ELECTIVE COURSES

13.1 Students have to choose Professional Elective Courses PEC-I, PEC-II in II semester, and PEC-III, PEC-IV, in III semester, from the list of elective courses given.

13.2 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Professional Elective Courses.

13.3 There shall be a limit on the minimum and maximum number of registrations based on class/section strength. The assessments of Elective Courses are same as regular theory courses.

14. OPEN ELECTIVE COURSES

14.1 Students have to choose Open Elective Courses OEC-I, in the IV semester, from the list of open elective courses given.

14.2 Registration forms are invited from the students 10 days prior to the last instructional day of the preceding semester for registration process for offering the Open Elective Courses.

14.3 There shall be a limit on the minimum and maximum number of registrations based on class/section strength. The assessments of Open Elective Courses are same as regular theory courses.

15. INDUSTRIAL VISIT / INDUSTRIAL TRAINING / INDUSTRIAL INTERNSHIP

15.1 Industrial Visit for every student is required to go for at least one Industrial Visit starting from the I year of the Program. The Heads of Departments shall ensure that necessary arrangements are made in this regard.

15.2 Industrial Training / Industrial Internship for every student is required to go for at least one Industrial Training / Industrial Internship at end of IV Semester of the Program. The Heads of Departments shall ensure that necessary arrangements are made in this regard.

16. EXTRA CURRICULAR ACTIVITIES

16.1 Students may enroll, on admission, in any one of the personality and character development programs (NSS/YRC etc.,) and undergo training and attend a camp.

16.2 The training shall include classes on hygiene and health awareness and also training in first aid. National Service Scheme (NSS) and Youth Red Cross (YRC) will have social service activities in and around the Institution. A student will be required to participate in an activity for an hour in a week during their program.

17. PRESERVATION OF RECORDS

17.1 The laboratory records and mid semester test papers shall be preserved for a minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

18. AWARD OF LETTER GRADES

18.1 As a measure of the student's performance, a 10-point Absolute Grading System using the following Letter Grades and corresponding percentage of marks shall be followed:

18.2 After each course is evaluated for 100 marks, the marks obtained in each course will be converted to a corresponding letter grade as given below, depending on the range in which the marks obtained by the student fall.

Structure of Grading of Academic Performance

Range in which the marks in the subject fall	Grade	Grade points Assigned
≥ 90	S (Superior)	10
$\geq 80 < 90$	A (Excellent)	9
$\geq 70 < 80$	B (Very Good)	8
$\geq 60 < 70$	C (Good)	7
$\geq 50 < 60$	D (Pass)	6
< 50	F (Fail)	0
Absent	Ab (Absent)	0

18.3 A student obtaining Grade 'F' or Grade 'Ab' in a subject shall be considered failed and will be required to reappear for that subject when it is offered the next supplementary examination.

19. SEMESTER GRADE POINT AVERAGE (SGPA)

19.1 The Semester Grade Point Average (SGPA) is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$SGPA = \Sigma (C_i \times G_i)/\Sigma C_i$$

Where, C_i is the number of credits of the ith subject and G_i is the grade point scored by the student in the ith course.

20. CUMULATIVE GRADE POINT AVERAGE (CGPA)

20.1 The Cumulative Grade Point Average (CGPA) will be computed in the same manner considering all the courses undergone by a student over all the semesters of a program, i.e.,

$$CGPA = \Sigma\ (C_i \times S_i)/ \Sigma\ C_i$$

where "S_i" is the SGPA of the ith semester and C_i is the total number of credits up to that semester.

20.2 Both SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

20.3 SGPA will be given to those who cleared all the subjects in that semester.

20.4 GRADE POINT: It is a numerical weight allotted to each letter grade on a 10-point scale.

20.5 LETTER GRADE: It is an index of the performance of students in a said course. Grades are denoted by letters S, A, B, C, D and F.

21. AWARD OF CLASS

21.1 After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of MCA Degree, he shall be placed in one of the following classification of performance of the students at the end of the course (after completing all the course requirements) will be based on CGPA (Cumulative Grade Point Average) as indicated below.

Class Awarded	CGPA Secured
First Class with Distinction	≥ 7.5
First Class	≥ 6.5 < 7.5
Second Class	≥ 5.5 < 6.5
Pass Class	≥ 5.0 < 5.5

21.2 CGPA to Percentage conversion Formula – (CGPA – 0.5) x 10

22. ISSUE OF PHOTOCOPY OF ANSWER SCRIPT

22.1 A student can request for the photocopy of answer script of any theory examination within one week after the declaring the results by paying fee.

22.3 The examination section shall issue a notification inviting applications for the issue of photocopy of answer script after publishing the results. The application forms can be obtained from the examination section.

23. REVALUATION

23.1 A candidate can apply for revaluation of his / her end examination answer paper in a theory course. The examination section shall issue a notification inviting applications for the revaluation after publishing the results.

23.2 A candidate can apply for revaluation of answer scripts in not more than 5 courses at a time. No revaluation for practical courses, comprehensive viva-voce / Examination and project work.

24. CHALLENGE VALUATION

24.1 A student can apply for challenge valuation by prescribed fee.

24.2 Challenging valuation shall be carried out by an external subject expert.

24.3 The challenging valuation should be done strictly as per the scheme of valuation supplied by the examination section in the presence of Principal.

24.4 The examination section shall issue a notification inviting applications for the challenging valuation after publishing the revaluation results.

24.5 The application forms can be obtained from the examination section.

25. TRANSITORY REGULATIONS

25.1 Discontinued, detained, or failed candidates are eligible for readmission as and when the semester is offered after fulfillment of academic regulations.

25.2 Candidates who have been detained for attendance shortage or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered and they will be in the academic regulations into which they get readmitted.

26. EXIT POLICY

26.1 The student shall be permitted to exit with a PG Diploma based on his/her request to the institute through Head of the Department at the end of first year subject to passing all the courses in first year.

26.2 The Institute shall resolve any issues that may arise in the implementation of this policy from time to time and shall review the policy in the light of periodic changes brought by UGC, AICTE and State government.

27. WITHHOLD OF RESULTS

27.1 If the candidate has any case of in-discipline pending against him, the result of the candidate shall be withheld, and he will not be allowed/promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

28. TRANSFER DETAILS

28.1 Student transfers shall be as per the guidelines issued by the Government of Andhra Pradesh from time to time.

29. GENERAL

29.1 The academic regulations should be read as a whole for purpose of any interpretation.

29.2 Malpractices rules- nature and punishments is appended.

29.3 Where the words "he", "him", "his", occur in the regulations, they also include "she", "her", "hers", respectively.

29.4 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Chairman of the academic council will be final. The college may, from time to time, revise, amend or change the regulations, scheme of examinations and syllabi.

30. AMENDMENTS TO REGULATIONS

30.1 The Academic Council of SITAMS (Autonomous) reserves the right to revise, amend or change the Regulations, Scheme of Examinations, and / or Syllabi or any other policy relevant to the needs of the society or industrial requirements etc., with the recommendations of the concerned Board(s) of Studies.

NATURE OF MALPRACTICES/ IMPROPER CONDUCT PUNISHMENT	PUNISHMENT
1. (a) possesses or keeps access in examination hall, any paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory/ practical) in which he/she is appearing but has not made use of (material shall include any marks on the body of the candidate which can be used as an aid in the subject of the examination) Expulsion from the examination hall and cancellation of the performance in that subject only.	Expulsion from the examination hall and cancellation of the performance in that subject Only.
1. (b) Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones with any candidate or persons inside or outside the exam hall in respect of any matter. Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he/she will be handed over to the police and a case is registered against him/her.	Expulsion from the examinations hall and cancellation of the performance in that subject only of all the candidates involved in case of an outsider He / She will be handed over to the police and a case is registered against him/her.

2. Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examinations hall and cancellation of the performance in that subject and all other subjects thecandidates has already appeared including practical examinations and projects workand shall not be permitted to appear for the reaming examinations of the subjects of that semester/Year. The Hall Ticket of the candidate will be cancelled and retained by the CE.
3. Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall and forfeits the seat. The performance of the original candidate, who has been impersonated, shall be cancelled in all the subjects of the examination (including practical's and project work) already appeared and shall not be allowed to appear for examinations of the remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidateis subject to the academic regulations in connection with forfeiture of seat.

4. Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper or answer book or additional sheet, during or after the examination.	If the imposter is an outsider, he/shewill be handed over to the police and a case is registered against him/her. Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all university examinations. The continuation of the course by the candidateis subject to the academic regulations in connection with forfeiture of seat.
5. Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
6. Refuses to obey the orders of the Chief - Superintendent / Assistant- Superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall or causes any injury to his person or to any of his relatives whether by offensive words spoken or written or by signs or by visible representation or assaults the officer-in- charge, or any person on duty inside or outside the examination hall or any of his relatives, or indulges in any other act of misconduct or mischief which results in damage to or destruction of property in the examination hall or any part of the college	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a police case is registered against them.

campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination.	
7. Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the candidate has already appeared including practical examinations and project work and shallnot be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all the external examinations. The continuation of thecourse by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8. Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat.

9. Belongs to college, who is not a candidate for the particular examination or any person not connected with the college but indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Student of the college will be expelled from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The candidate is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a Police case will be registered against them.
10. Comes in a drunken state to the examination hall.	Expulsion from the examination hall and cancellation of the performance.
11. Copying is detected on the basis of internal evidence, such as, during valuation or during special scrutiny	Cancellation of the performance in that subject and all other subjects the candidate has appeared including practical examinations and project work of that Semester / year examinations.
12. If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the Principal for further action to award suitable punishment.	

Note: Failing to read the regulation is not considered as an excuse

SREENIVASA INSTITUTE of TECHNOLOGY and MANAGEMENT STUDIES, CHITTOOR
(Autonomous)
MCA Department

MCA COURSE STRUCTURE
(Regular) (2024 – 25)

I MCA- I Semester

S. No.	Course Code	Subject	Subject Category	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	24MCA111	Mathematical Foundations of Computer Science	PC	3	1	-	4	40	60	100
2	24MCA112	Data Structures using C	PC	4	-	-	4	40	60	100
3	24MCA113	Java Programming	PC	4	-	-	4	40	60	100
4	24MCA114	Computer Networks	PC	4	-	-	4	40	60	100
5	24MCA115	Database Management Systems	PC	4	-	-	4	40	60	100
6	24MCA116	Data Structures using C Lab	PC	-	1	2	2	40	60	100
7	24MCA117	Java Programming Lab	PC	-	1	2	2	40	60	100
8	24MCA118	DBMS Lab	PC	-	1	2	2	40	60	100
9	24MCA119	**Skill Enhancement Course 1:** Employability Skills lab	SOC	1	-	2	2	40	60	100
Contact periods per week				20	4	8				
Total periods per week				32						
Total credits (5 Theory+3 Labs+ SEC)							28			
Total marks								360	540	900

I MCA- II Semester

S. No.	Course Code	Subject	Subject Category	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
				L	T	P	C	Internal	External	Total
1	24MCA121	Operating Systems	PC	4	-	-	4	40	60	100
2	24MCA122	Python Programming	PC	4	-	-	4	40	60	100
3	24MCA123	Full Stack Web Development	PC	4	-	-	4	40	60	100
4	24MCA124	**Professional Electives-I** **A.** Artificial Intelligence **B.** Digital Image Processing **C.** Cyber Security	PE	3	-	-	3	40	60	100
5	24MCA125	**Professional Electives- II** **A.** Data Mining & Business Intelligence **B.** Cloud Computing **C.** Mobile Applications using Android	PE	3	-	-	3	40	60	100
6	24MCA126	Python Programming Lab	PC	-	1	2	2	40	60	100
7	24MCA127	Full Stack Web Development Lab	PC	-	1	2	2	40	60	100
8	24MCA128	Linux Programming Lab	PC	-	1	2	2	40	60	100
9	24MCA129	**Skill Enhancement Course-2:** Data Visualization Using Power BI	SOC	1	-	2	2	40	60	100
10	24MAC121	Universal Human Values	AC	2	-	-	-	P	-	-
11	MOOC	**MOOC**	MOOC	-	-	-	2	-	-	-
Contact periods per week				21	3	8				
Total periods per week				34						
Total credits (5 Theory+3 Labs+ SEC+MOOC)							28			
Total marks								360	540	900

II MCA- III Semester

S. No.	Course Code	Subject	Subject Category	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
				L	T	P	C	Internal Exam	External Exam	Total
1	24MCA211	Machine Learning	PC	4	-	-	4	40	60	100
2	24MCA212	Software Engineering	PC	4	-	-	4	40	60	100
3	24MCA213	Big Data Analytics	PC	4	-	-	4	40	60	100
4	24MCA214	**Professional Electives – III** **A.** Natural Language Processing **A.** Quantum Computing **B.** Service Oriented Architecture	PE	3	-	-	3	40	60	100
5	24MCA215	**Professional Electives – IV** **A.** Data Science **B.** Block Chain Technology **C.** Internet of Things	PE	3	-	-	3	40	60	100
6	24MCA216	Machine Learning Lab	PC	-	1	2	2	40	60	100
7	24MCA217	Bigdata Analytics Lab	PC	-	1	2	2	40	60	100
8	24MCA218	Dev Ops& Agile Programming Lab	PC	-	1	2	2	40	60	100
9	24MCA219	**Skill Enhancement Course – 3:** Prompt Engineering	SOC	1	-	2	2	40	60	100
10	24MCAAC2	Design Thinking and Innovation	AC	2	-	-	-	P	-	-
Contact periods per week				21	3	8				
Total periods per week				34						
Total credits (5 Theory+3 Labs+ SAC)							26			
Total marks								360	540	900

II MCA- IV Semester

S. No.	Course Code	Subject	Subject Category	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
				L	T	P	C	Internal Exam	External Exam	Total
1	24MCA221	Deep Learning	PC	4	-	-	4	40	60	100
2	OE	**Open Electives**	OE	4	-	-	4	40	60	100
3	24MCA223	Project Work	PW	-	-	-	10	40	60	100
4	24MCA224	**Skill Enhancement Course -4** Deep Learning using Python Lab	SOC	-	1	2	2	40	60	100
Contact periods per week				8	1	2				
Total periods per week				11						
Total credits (2 Theory+ PW+ SOC)							20			
Total marks								160	240	400

Open Electives (Semester – IV)

S. No.	Course Code	Subject	Offered Department	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
				L	T	P	C	Internal Exam	External Exam	Total
1	24OMBA41	Entrepreneurship	MBA	4	-	-	4	40	60	100
2	24OMBA42	Management and Organizational Behavior	MBA	4	-	-	4	40	60	100
3	24OMBA43	Research Methodology and IPR	MBA	4	-	-	4	40	60	100
4	24OHSM41	Optimization Techniques	SAH	4	-	-	4	40	60	100
5	24OHSM42	Nano Science and Technology	SAH	4	-	-	4	40	60	100

I MCA – I SEMESTER			
COURSE CODE:	**24MCA111**	**CREDITS:**	**4**
COURSE TITLE:	**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**	**L-T-P:**	**3-1-0**

PREREQUISITES: *Basic Mathematics*

COURSE EDUCATIONAL OBJECTIVES:
   CEO1: *To gain the knowledge on connectives and normal forms.*
   CEO2: *To learn the various concepts related to predicate logic.*
   CEO3: *To perform the operations associated with sets, functions, and relations and study the basic properties of lattices.*
   CEO4: *To understand the concept of groups, Abelian groups and group homomorphism and isomorphism.*
   CEO5: *To study the fundamentals of graphs, sub graphs, planar graphs, Hamiltonian graphs, Euler graphs, spanning trees and graph traversals.*

UNIT - 1: MATHEMATICAL LOGIC	*Lecture Hrs:12*

Statements and Notations - Connectives(Negation, Conjunction , Disjunction, Conditional and Biconditional - Statements Formulas and Truth Tables - Well-Formed Formulas, Tautologies - Equivalence of Formulas - Duality Law - Tautological Implications - Normal Forms (DNF, CNF) - Theory of Inference for Statement Calculus: Validity using Truth tables - Rules of Inference - Consistency of Premises and Indirect Method of Proof.

UNIT - II: PREDICATE CALCULUS	*Lecture Hrs:12*

Predicates - The Statement Function - Variables - Quantifiers - Predicate Formulas - Free and Bound Variables - The Universe of Discourse - Theory of Inference for Predicate Calculus: Valid Formulas and Equivalences - Some Valid Formulas over Finite Universes - Special Valid Formulas Involving Quantifiers.

UNIT -III:RELATIONS & FUNCTIONS	*Lecture Hrs:10*

Relations: Properties of Binary Relations, Equivalence - Closure of Relations - Compatibility and Partial Ordering Relations - Hasse Diagram.

Functions: Inverse function - Composition of Functions - Recursive Functions - Pigeon Hole Principles and its Applications.

UNIT - IV: ALGEBRAIC STRUCTURES	*Lecture Hrs:10*

Algebraic Systems - Examples and General Properties - Semi Groups - Monoids - Groups and Subgroups - Homomorphism and Isomorphism.

UNIT - V: GRAPH THEORY	*Lecture Hrs:12*

Basic Terminology - Multi Graphs - Weighted Graphs - Digraphs and Relations - Representations of Graphs (Incidence Matrix, Adjacency Matrix) - Operations on Graphs - Isomorphism and Sub Graphs. Paths and Circuits - Graph Traversals(DFS, BFS) - Shortest Paths in Weighted Graphs - Eulerian Paths and Circuits - Hamiltonian Paths and Circuits - Planar Graph - Graph Coloring - Spanning Trees - Minimum Spanning Trees - Kruskal's Algorithm - Prim's Algorithm.

TEXT BOOKS:

1. Discrete Mathematical Structures with Applications to Computer Science, J.P. Tremblay and R.Manohar, 1/e, Tata McGraw Hill Publishers, 2017, New Delhi.

2. Elements of Discrete Mathematics – A Computer Oriented Approach, C.L. Liu, D.P. Mohapatra,4/e, Tata McGraw Hill Publishers, 2017, New Delhi.

REFERENCE BOOKS:

1. Discrete and Combinational Mathematics – An Applied introduction, Ralph. P. Grimaldi, 5/e, Pearson Education, 2008, New Delhi.2. Discrete Mathematics and its applications,Kenneth H. Rosen, 6/e, Tata McGraw Hill Publishers, New Delhi.

3. Discrete Mathematics for Computer Science, 4/e, 2007, Gary Haggard, John Schlipf, Sue Whitesides, Thomson Pulication, 2008,New Delhi.

4. Discrete Mathematics for ComuterScientists&Mathematicans, Mott,Kandel, Banker, 2/e, PrenticeHall India, 2015, New Delhi.

5. Discrete Mathematics, Lipschutz, Lipson, Schaum's outlines, 3/e, Tata McGraw Hill Publishers,2007, New Delhi.

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*	POs related to COs
CO1 **Understand** the validity of statements using connectives, tautologies, equivalence, implications and solve the problems using normal forms.	**PO1, PO2,PO3**
CO2 **Solve** the problems using statement calculus, predicate calculus and **analyze** the equivalence of quantified statements.	**PO1, PO2, PO3**
CO3 **Identify** and describe various types of relations (Compatibility, Partial ordering and Equivalence elations) and **analyze** the functions concepts and distinguish different types of functions	**PO1, PO2, PO3**
CO4 **Understand** the concept of groups, Abelian groups and **analyze** whether the given set satisfies the properties of group or not	**PO1,PO2, PO3, PO4**
CO5 **Design** network applications using Prim's and Kruskal's Algorithms and Demonstrate different traversal methods for graphs	**PO1, PO2,PO3,PO4**

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C101: Mathematical Foundations of Computer Science	**C101.1**	3	3	3	-	-	-	-	-
	C101.2	3	3	3	-	-	-	-	-
	C101.3	2	3	3	-	-	-	-	-
	C101.4	2	3	3	2	-	-	-	-
	C101.5	3	3	3	3	-	-	-	-
	C101	2.6	3	3	2.5	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

I MCA – I SEMESTER			
COURSE CODE:	**24MCA112**	**CREDITS:**	**4**
COURSE TITLE:	**DATA STRUCTURES USING C**	**L-T-P:**	**4-0-0**

PREREQUISITES: *Knowledge on Information Technology and Logical skills may be helpful.*

COURSE EDUCATIONAL OBJECTIVES*:*

CEO1	*To explore the fundamental concepts of C*
CEO2	*To explore the fundamental concepts of Data Structures*
CEO3	*To familiarize with Stack, Queue and Linked lists data structures.To Understand various Sorting and Searching Techniques*
CEO4	*To explain the concepts of non-linear data structures like graphs and trees.*
CEO5	*To learn the different types of searching and sorting techniques.*

UNIT - I : INTRODUCTION TO THE C LANGUAGE	*Lecture Hrs:12*

Introduction to C Language - C Language Elements, Variable Declarations and Data Types, Operators and Expressions, Decision Statements - If and Switch Statements, Loop Control Statements -while, for, do-while Statements. Introduction to Functions, Storage classes, Arrays, Structures, Unions, Pointers, Strings and Command line arguments.

UNIT - II : DATA STRUCTURES, STACKS AND QUEUES	*Lecture Hrs:12*

Overview of Data Structure, Representation of a Stack, Stack Related Terms, Operations on a Stack, Implementation of a Stack, Evaluation of Arithmetic Expressions, Infix, Prefix, and Postfix Notations, Evaluation of Postfix Expression, Conversion of Expression from Infix to Postfix, Queues - Representation of Queue, Insertion, Deletion, Searching Operations.

UNIT - III: LINKED LISTS–POINTERS	*Lecture Hrs:12*

Singly Linked List, Polynomials Using Singly Linked Lists, Using Circularly Linked Lists, Insertion, Deletion and Searching Operations, Doubly linked lists and its operations, Circular linked lists and its operations.

UNIT - IV : TREES AND GRAPHS	*Lecture Hrs:10*

Tree terminology, representation, Binary tress, representation, Binary tree traversals. Binary Tree Operations, Graphs- Graph terminology, Graph representation, Elementary Graph Operations, Breadth first search (BFS) and Depth first search (DFS), Spanning Trees.

UNIT - V : SEARCHING AND SORTING	*Lecture Hrs:8*

Sequential, Binary, Exchange (Bubble) Sort, Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort. Searching- Linear and Binary Search Methods.

TEXT BOOKS:

1. *The C Programming Language, Brian W Kernighan and Dennis M Ritchie, Second Edition, Prentice Hall Publication.*
2. *Fundamentals of Data Structures in C, Ellis Horowitz, SartajSahni, Susan Anderson-Freed, Computer Science Press.*
3. *Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. AnandaRao, Pearson Education.*

REFERENCE BOOKS:

1. *Programming in C, 3/e, 2008, Stephen G. Kochan, Pearson Education, New Delhi.*
2. *C Programming & Data Structures, 3/e, 2009, B.A.Forouzan and R.F. Gilberg,, Cengage Learning, New Delhi.*
3. *C and Data Structures, 1/e, 2010, Dr. N.B. Venkateswarlu, Dr. E.V. Prasad, S. Chand & Company Limited, New Delhi.*
4. *Mastering C, 2007, K.R. Venugopal and S.R. Prasad, Tata Mcgraw-Hill, New Delhi.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** about the knowledge of C, different types of logical constructs using looping and processing arrays , strings and pointers	PO1,PO2,PO3
CO2	**Familiarize** with basic data structures such as Linked list, Stack, Queue. **Compare and contrast** the functionalities and application of different data structures.	PO1,PO2,PO3
CO3	Analyze various operations on linked list. **contrast** the functionalities and application of various types of Linked Lists.	PO1,PO2,PO3,
CO4	**Develop the representation of trees and graphs. Identifying** suitable algorithms with appropriate data structures for real time software requirements	PO1,PO2,PO3,
CO5	**Design and develop** different sorting and searching technique	PO1,PO2,PO3,

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C102: Data Structures using C	**C102.1**	3	2	2	3	-	-	-	-
	C102.2	3	3	2	3	-	-	-	-
	C102.3	3	2	2	3	-	-	-	-
	C102.4	3	3	3	3	-	-	-	-
	C102.5	3	3	3	3	-	-	-	-
	C102	3	2.6	2.4	3	-	-	-	-

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

I MCA – I SEMESTER			
COURSE CODE:	**24MCA113**	**CREDITS:**	**4**
COURSE TITLE:	**JAVA PROGRAMMING**	**L-T-P:**	**4-0-0**

PREREQUISITES: *A course on "C Programming" may be useful*

COURSE EDUCATIONAL OBJECTIVES:

CEO1	*To learn Java basic concepts.*
CEO2	*To Explore Java Inheritance, Interfaces and Collection Framework.*
CEO3	*To Create and use Java Packages.*
CEO4	*To Design Applets using swing package.*
CEO5	*To Learn Handling of Exceptions and Events.*

UNIT - I :	FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING	*Lecture Hrs:12*

Introduction, Object-Oriented Paradigm, Basic Concepts of Object-Oriented Programming, Benefits of OOP, Applications of OOP, Java History, Java Features, How Java differs from c and c++, Java Environment, constants, Data Types, Variables, Type Conversion and Casting, Automatic Type Promotion in Expression, Arrays, Operators and Expressions, Control Statements. Java 8 Features

UNIT - II:	INHERITANCE AND PACKAGES	*Lecture Hrs:12*

Introduction, Defining a Class, Adding Variables, Adding Methods, Creating Objects, Accessing Class members, Constructors, Method Overloading, Static members, Inheritance, Overriding Methods, Final Variables ,Methods and classes, Abstract Methods and Classes, Visibility control, Packages-Introduction, Java API Package, Using System Package, Naming Conventions, Creating Packages, Accessing a Package.

UNIT - III:	INTERFACES AND COLLECTION FRAMEWORK	*Lecture Hrs:12*

Interfaces-Defining an Interface, Implementing Interfaces, Interfaces can be extended, Collections Overview: The Collection Interfaces – The List Interface, The Set Interface, The Collections Classes – Hash Set, Stack, Linked List, Array List, Vector, Accessing a Collection Via an Iterator, String, String Buffer Class, Utility classes – String Tokenizer, Scanner

UNIT - IV :	EXCEPTION HANDLING, MULTITHREADING AND APPLETS	*Lecture Hrs:12*

Exception Handling Fundamentals, Exception types, Uncaught Exception, Using try and caught, Multiple catch Clauses, Nested try statements, throw, throws, finally, Java's Built-in Exceptions, user defined Exceptions, Multithreaded Programming – Thread States, Life Cycle of a Thread, Creating a Thread, Creating Multiple Threads, Thread Priorities. Applets:How Applets differ from Applications, Building Applet Code, Applet Life Cycle, Designing a web page, Applet tag, Adding Applet to HTML File, Running the Applet.

UNIT - V :	EVENT HANDLING AND SWINGS	*Lecture Hrs:12*

Two Event Handling Mechanism, The Delegation Event Model, Event Classes, Sources of Events, Event Listeners Interfaces, Adapter Classes. Swings - The Origins of Swings, Swing is Built on the AWT, Swing Features , Swing Components and Containers , A Simple Swing Application, Event Handling, Creating a Swing Applet-Exploring Swing.

TEXT BOOKS:

1. *Java: The Complete Reference, 7/e, 2008, Herbert schildt , Tata McGraw Hill- New Delhi.*

2. *"Programming with Java", 7/e, 2023online , E. Balaguruswamy, Tata McGraw Hill- New Delhi*

REFERENCE BOOKS:

1. *Core Java- Volume 1-Fundamentals, 8/e, 2012, Cay S. Horstmann and Gary Cornell- Pearson Education, New Delhi.*
2. *Core Java- Volume2-Advanced Features, 8/e, 2012, Cay.S. Horstmann and Gary Cornell, Pearson Education, New Delhi.*
3. *Advanced Programming in Java 2, 2/e, 2005, K. Somasundaram , Jaico Publishing House, New Delhi.*
4. *Maurach's Beginning Java2-D.Lowe ,1/e, 2005, J.Murach A. Steelman- Shroff Publishers and Distributors, New Delhi.*
5. *Introduction to Java Programming, 6/e, 2006, Y. Daniel Liang, Pearson Education, New Delhi.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Experiment** Object Oriented Programming Concepts such as class, object, abstraction to solve real world problems using Java.	PO1,PO2, PO3
CO2	**Explore** how to organize various classes as packages and types of inheritance to solve the given problem	PO1,PO2, PO3,PO4
CO3	**Identify and Solve** problems using java Interfaces and Collection framework	PO1,PO2, PO3,PO4, PO8
CO4	**Handle** the run time errors using exceptional handling mechanism and concurrent tasks using threads	PO1,PO2, PO3,PO4, PO8
CO5	**Design** Internet Applications using java Applets and components of swing package	PO1,PO2, PO3,PO4, PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C103: Java Programming	C103.1	3	2	2	2	-	-	-	-
	C103.2	3	3	3	3	-	-	-	-
	C103.3	3	3	3	3	-	-	-	-
	C103.4	3	3	2	3	-	-	-	2
	C103.5	3	3	3	3	-	-	-	2
	C103	3	2.8	2.6	2.8				2

I MCA – I SEMESTER			
COURSE CODE:	**24MCA114**	**CREDITS:**	**4**
COURSE TITLE:	**COMPUTER NETWORKS**	**L-T-P:**	**3-1-0**

PREREQUISITES: Basic knowledge on "Computer Architecture"

COURSE EDUCATIONAL OBJECTIVES:
  CEO1 To introduce the basics and various types of Computer Networks.
  CEO2 To understand the functionality of each layer of OSI and TCP/IP models and interactions between them with merits and demerits.
  CEO3 To gain basic insight of various Protocols and Services.
  CEO4 To introduce TCP and UDP Models.
  CEO5 To familiarize the Network Applications.

UNIT - I : INTRODUCTION	*Lecture Hrs:8*

Uses of Computer Networks- Network Hardware- Network Software- References Models. The Physical Layer: Guided Transmission Media- Wireless Transmission- Communication Satellites.

UNIT - II : THE DATA LINK LAYER	*Lecture Hrs:12*

Data link Layer Design Issues- Error Detection and Correction -Elementary Data Link Protocols- Sliding Window Protocols - Example Data Link Protocols. **The Medium Access Control Sublayer:** Multiple Access protocols- Ethernet- Ethernet Cabling- Manchester Encoding- The Ethernet MAC Sublayer Protocol-The Binary Exponential Backoff Algorithm- Ethernet Performance, Wireless LANs

UNIT - III : THE NETWORK LAYER	*Lecture Hrs:12*

Network Layer Design Issues- Routing Algorithms: The Optimality Principle, Shortest Path Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile hosts- Congestion Control: General principles of congestion control, Congestion prevention policies . Quality of Service: Leaky Bucket Algorithm, Token Bucket Algorithm- The Network Layer in the Internet: The IP Protocol, IP Addresses.

UNIT - IV : THE TRANSPORT LAYER	*Lecture Hrs:12*

The Transport Service- Elements of Transport Protocols- The Internet Transport Protocols: UDP- The Internet Transport Protocols :TCP: Introduction to TCP, The TCP Service Model,The TCP Protocol, The TCP Segment Header, TCP Connection Establishment, TCP Connection Release, TCP Transmission Policy, TCP Congestion Control.

UNTI – V: THE APPLICATION LAYER	*Lecture Hrs:12*

DNS-The domain name system - Electronic mail- The World Wide Web: Architectural Overview, Static Web Documents, Dynamic Web Documents- HTTP-The Hypertext Transfer Protocol.

TEXT BOOKS:.

1. *Computer Networks, 4/e, 2008, Andrew S. Tanenbaum, Pearson Education, New Jersey.*
2. *Data Communications and Networking, 4/e, 2006, Behrouz A. Forouzan, Tata McGraw Hill, New Delhi.*

REFERENCE BOOKS:

1. *Computer Communications and Networking Technologies,1/e, 2011, Michael A.Gallo, William M. Hancock, Cengage Learning, New Delhi.*
2. *Computer Networks: Principles, Technologies and Protocols for Network Design,1/e, 2006, Natalia*

Olifer, Victor Olifer, Wiley India, New Jersey.
3. *Computer and Communication Network,1/e, 2007, Nader F. Mir, Pearson Education, New Jersey.*
4. *Computer Networking: A Top-Down Approach Featuring the Internet, 3/e, 2005, James F.Kurose - K.W.Ross, Pearson Education, New Jersey.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Illustrate** basic concepts, terminology and **enumerate** the layers of the different reference models and can explain the function(s) of each layer.	PO1,PO2
CO2	**Understand** the design issues of data link layer and how standard problems are solved in the context of Wireless networks.	PO1,PO2
CO3	**Explore** network design issues and**Learn** various routing and congestion control algorithms	PO1,PO2, PO3, PO4,
CO4	**Describe** the elements of transport layer services and protocols	PO1,PO2, PO8
CO5	**Conceptualize** the working nature of the applications such as electronic mail, world wide web and domain name systems.	PO1,PO2, PO3, PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs** / **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C104: Computer Networks	**C104.1**	3	3	-	-	-	-	-	-
	C104.2	3	3		-	-	-	-	-
	C104.3	3	2	3	2	-	-	-	-
	C104.4	3	2	-	-	-	-	-	2
	C104.5	3	2	2	-	-	-	-	2
	C104	3	2.4	2.5	2	-	-	-	2

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

I MCA – I SEMESTER			
COURSE CODE:	**24MCA115**	**CREDITS:**	**4**
COURSE TITLE:	**DATABASE MANAGEMENT SYSTEMS**	**L-T-P:**	**4-0-0**

PREREQUISITES: Knowledge on Relational algebra may be helpful.

COURSE EDUCATIONAL OBJECTIVES:

CEO1 *To expose the students to the fundamentals of Database Management Systems.*
CEO2 *To make the students understand the relational model and familiarize the students with ER diagrams.*
CEO3 *To To expose the students to SQL and to familiarize the students with the normalization process.*
CEO4 *To make the students to understand the fundamentals of Transaction Processing and Query Processing.*
CEO5 *To make the students to understand the fundamentals of Concurrent Processing and Recoverability.*

UNIT - I :INTRODUCTION & DATABASE DESIGN AND E-R MODEL	*Lecture Hrs:12*

Database System Applications - Purpose of Database Systems - View of Data - Database Languages - Database Design - Database Architecture - Database Users and Administrators. The Entity-Relationship Model – Entity Sets –Relationship sets –Attributes –Entity-Relationship Diagrams –Weak Entity Sets – Extended E-R Features

UNIT - II: THE RELATIONAL MODEL	*Lecture Hrs:8*

Introduction to The Relational Model –Integrity Constraints over Relations – Querying Relational Data– Logical Database Design: ER to Relational. Relational Algebra And Calculus – Preliminaries – Relational Algebra – Relational Calculus – Expressive power of Algebra and Calculus.

UNIT - III:SQL & PL/SQL	*Lecture Hrs:12*

Interactive SQL Part I - Types of Data Constraints - Computations done on Table Data - Oracle functions - Grouping Data from Tables in SQL - Sub queries – Joins - Concatenation data from table columns using the Union - Intersect and Minus Clause – Views – Sequences - Granting and Revoking Permissions - Advantages of PL/SQL - The Generic PL/SQL block - Control Structure - What is Cursor - Database Triggers - Types of Triggers.

UNIT - IV :RELATIONAL DATABASE DESIGN	*Lecture Hrs:12*

Schema refinement and Normal Forms – Introduction to schema refinement – Functional Dependencies– Reasoning about FDS – Normal Forms – Properties of Decompositions – Normalizations. Transaction Concept - Transaction States - Concurrency Executions – Serializability – Recoverability - Testing for Serializability.

UNIT – V: CONCURRENCY CONTROL & RECOVERY SYSTEM	*Lecture Hrs:12*

Lock-Based Protocol - Timestamp-Based Protocols - Validation-Based Protocols - Deadlock Handling. Failure Classification - Storage Structure - Recovery and Atomicity - Log-Based Recovery - Recovery with Concurrent Transactions

TEXT BOOKS :

1. *Database System Concepts, 7/e, 2019, Korth, Silbertz, Sudarshan, TATA McGraw- Hill, New Delhi.*
2. *Data base Management Systems, 3/e, 2021online, Raghu Ramakrishnan , Johannes Gehrke, Mc Graw Hill, New Delhi.*

REFERENCE BOOKS :

1. *Fundamentals Of Database Systems, 5/e, 2008, Elmasri,Navathe, Pearson Education, New Delhi.*
2. *Introduction to Database Systems, 8/e, 2008, C.J.Date, Pearson Education, New Delhi.*
3. *Database Management Systems , 1/e, 2011, Peter Rob, A.Anand Rao and Carlos Coronel, Cengage Learning.*
4. *SQL, PL/SQL Programming, 3/e, 2005, Ivan Bayross, BPB Publications, New Delhi.*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Gain** an insight into the concepts of Databases System and the basic elements of a relational database management system.	**PO1,PO2,PO3**
CO2	**Identify** the data models and Problem Solving using queries in Relational model and mathematical notations of relational algebra.	**PO1,PO2, PO3 PO8**
CO3	**Able** to learn SQL Query Processing for information retrieval and Visualization.	**PO1, PO2, PO3,PO4**
CO4	**Experiment** Normalization and professional attitudes for the development of Consistent Database and Transaction Management.	**PO1,PO2, PO3, PO4**
CO5	**Conceptualize** Concurrency Control and Recovery Techniques to avoid data anomalies.	**PO1, PO2, PO3, PO8**

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs** **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C105: Data Base Management Systems	**C105.1**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**
	C105.2	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**2**
	C105.3	**2**	**2**	**3**	**2**	**-**	**-**	**-**	**-**
	C105.4	**3**	**3**	**2**	**2**	**-**	**-**	**-**	**-**
	C105.5	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**3**
	C105	**2.8**	**2.4**	**2.4**	**2**				**2.5**

I MCA – I SEMESTER			
COURSE CODE:	**24MCA116**	**CREDITS:**	**2**
COURSE TITLE:	**DATA STRUCTURES USING C LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: *A course on "Data Structures using C"*

COURSE EDUCATIONAL OBJECTIVES:

CEO1 *To acquire knowledge about the basic concept of writing a C program*

CEO2 *Know the role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.*

CEO3 *Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.*

CEO4 *Implement Bubble Sort, selection sort and insertion sort method to sort a given list of integers.*

CEO5 *Demonstrate familiarity with major algorithms and data structures.*

1. C programs using Control Structures.

2. C Programs using Recurtion.

3. C Programs using Arrays.

4. C programs using matrix operations

5. C programs using Structures.

6. C programs using Union.

7. C Programs using Pointers

8. C programs using Files.

9. C programs using Linked Lists

10. C Programs using Stack operations.

11. C programs using Queues.

12. C programs to implement Searching algorithms.

13. C programs to implement Sorting algorithms

C programs to implement insertion and deletion operations in binary serch tree.

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** knowledge on writing program using C for Data Structures to solve real life applications.	PO1
CO2	**Analyse** the given problem and Identify suitable algorithm and data structure to solve the problem	PO2
CO3	**Design** of algorithms for the given problem specifications and **identify** the appropriate data structure to develop real time applications.	PO3
CO4	**Utilize** appropriate tools to execute the programs, and thoroughly understand the advantages and limitations of each tool.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C106: Data Structures using C Lab	C106.1	3	-	-	-	-	-	-	-
	C106.2	-	3	-	-	-	-	-	-
	C106.3	-	-	3	-	-	-	-	-
	C106.4	-	-	-	3	-	-	-	-
	C106.5	-	-	-	-	3	-	-	-
	C106.6	-	-	-	-	-	-	3	-
	C106.7	-	-	-	-	-	-	-	3
	C106	3	3	3	3	3	-	3	3

I MCA – I SEMESTER			
COURSE CODE:	**24MCA117**	**CREDITS:**	**2**
COURSE TITLE:	**JAVA PROGRAMMING LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: A course on "Object Oriented Programming Through Java"

COURSE EDUCATIONAL OBJECTIVES:

 CEO1 To Practice Basic Java Programs.
 CEO2 To Illustrate Class, Object Concepts.
 CEO3 To Illustrate Inheritance, Interface, packages, Abstract Classes Concept.
 CEO4 To Handle Exceptions and Events.
 CEO5 To Develop Applets.

1) Write a Java program
 a) To Find Sum of N Numbers.
 b) To Find Product of N Numbers.
 c) To Print Even Numbers and Odd Numbers from 1 to N.
2) Write a Java Program to Print sum of Individual Numbers in a Given Number.
3) Write a Java Program to Print Armstrong Numbers from 1 to 1000.
4) Write a Java Program to Print whether a given number is Super Number or not.
5) Write a Java program that prints all real solutions to the Quadratic Equation $Ax^2 + Bx + C = 0$. Read A, B, C and use the Quadratic Formula. If the discriminate b^2 -4ac is negative, display a message stating that there are no real solutions.
6) Write a java program that uses both recursive and non-recursive methods.
 a) To find the factorial of a given number.
 b) To compute Ncr.
7) The Fibonacci sequence is defined by the following rule : The first two values in the sequence are one and one. Every subsequent value is the sum of the two values preceding it.
Write a java program that uses both recursive and non-recursive functions to print the nth value in the Fibonacci sequence.
8) Write a java program that prompts the user for an integer and then prints out all the prime numbers up to that integer.
9) Write a Java program to find both the largest and smallest number   in a list of integers.
10) Write a Java Program to sort list of Numbers in both ascending Order and Descending Order.
11) Write a Java program to perform
 a) Addition of two Matrices
 b) Subtraction of two Matrices
 c) Multiplication of two Matrices
12) Write a Java program to perform the following operations:
 a) Concatenation of two Strings.
 b) Comparison of two Strings.
13) Write a Java program that uses functions to perform the following operations:
 a) Inserting a sub-string in to the given main string from a given position.
 b) Deleting n characters from a given position in a given string.
14) Write a Java program that checks whether a given string is a palindrome or not.

15) Write a Java program to make frequency count of words in a given text.

16) Write a Java Program to sort set of Names in both ascending Order and Descending Order.

17) Write a Java Program to Perform
    a) Linear Search
    b) Binary Search

18) Write a Java Program to Illustrate
    a) Constructor OverLoading
    b) Method OverLoading

19) Write a Java Program to Illustrate
    a) Single Inheritance
    b) Hierarchical Inheritance
    c) MultiLevel Inheritance

20) Write a Java Program to Illustrate
    a) Interfaces
    b) Abstract Class

21) Write a Java Program to Illustrate Method Overriding concept.

22) Write a Java program that illustrates the following
    a) Creation of simple package.
    b) Accessing a Package

23) Write a Java programs that illustrates the following
    a) Handling predefined Exceptions.
    b) Handling User Defined Exceptions .

24) Write a Java program that creates a user interface to perform integer divisions. the user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayed in the result field when the divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a number format exception. If Num2 were Zero, the program would throw an Arithmetic Exception display the exception in a message dialog box.

25) Write a Java Program for Creating Multiple Threads
    a) By Extending Thread Class
    b) By Implementing Runnable Interfaces

26) Write a Java program that correctly implements producer consumer problem using the concept of Inter Thread Communication.

27) Write a Java Program to Illustrate the Following Collection Classes
    a) Stack
    b) HashSet
    c) LinkedList
    d) Vector

28) Develop an Applet in Java that displays a simple message.

29) Develop an Applet to Illustrate
    a) Graphics Class Methods
    b) Color Class Methods
    c) Font Class Methods

30) Develop an Applet to Illustrate Different Layouts

31) Develop an Applet in Java that receives an integer in one text field, and computes its factorial value and returns it in another text field, when the button named "compute" is clicked.

32) Write a Java program that works as a simple calculator. use a grid layout to arrange buttons for the

digits and for the +, -,*, % operations. add a text field to display the result.

33)   Write a Java program for handling
   a)   Mouse Events
   b)   Keyboard Events

REFERENCE BOOKS :

1. *Java: How to Program, 5/e, 2005, P.J.Deitel and H.M.Deitel , Low Price Edition-India.*
2. *Core Java- Volume 1-Fundamentals, 8/e, 2012, Cay S.Horstmann and Gary Cornell- Pearson Education, New Delhi.*
3. *Core Java- Volume2-Advanced Features, 8/e, 2012, Cay.S. Horstmann and Gary Cornell, Pearson Education, New Delhi.*
4. *Introduction to Java Programming, 6/e, 2006, Y. Daniel Liang, Pearson Education, New Delhi.*
5. *Java:,The Complete Reference" , 7/e , 2008, Herbert schildt ,Tata McGraw Hill- New Delhi.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** knowledge on writing program using Java to solve real life applications.	PO1
CO2	**Analyse** the given problem and Identify suitable algorithm and data structure to solve the problem	PO2
CO3	**Design** of algorithms for the given problem specifications and **identify** the appropriate control structuresto develop real time applications.	PO3
CO4	**Utilize** appropriate tools to execute the programs, and thoroughly understand the advantages and limitations of each tool.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C107: Java Programming Lab	C107.1	3	-	-	-	-	-	-	-
	C107.2	-	3	-	-	-	-	-	-
	C107.3	-	-	3	-	-	-	-	-
	C107.4	-	-	-	3	-	-	-	-
	C107.5	-	-	-	-	3	-	-	-
	C107.6	-	-	-	-	-	-	3	-
	C107.7	-	-	-	-	-	-	-	3
	C107	3	3	3	3	3	-	3	3

I MCA – I SEMESTER			
COURSE CODE:	**24MCA118**	**CREDITS:**	**2**
COURSE TITLE:	**DATABASE MANAGEMENT SYSTEMS LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: *A course on "Database Management Systems"*

COURSE EDUCATIONAL OBJECTIVES:

CEO1   *Learn to create and use a database.*
CEO2   *Be familiarized with a query language.*
CEO3   *Have hands on experience on DDL Commands.*
CEO4   *Have a good understanding of DML Commands and DCL commands.*
CEO5   *Familiarize advanced SQL queries.*
CEO6   *Learn to write PL/SQL programs.*

1. DDL COMMANDS.

2. DML COMMANDS.

3. DISTINCT , ORDER BY CLAUSE.

4. ORACLE FUNCTIONS.

5. TYPES OF DATA CONSTRAINTS.

6. COMPUTATIONS DONE ON TABLE DATA.

7. GROUPING DATA FROM TABLES IN SQL.

8. SUBQUERIES.

9. JOINS.

10. CONCATENATING DATA FROM TABLE COLUMNS USING THE UNION, INTERSECT AND MINUS CLAUSE.

11. VIEWS.

12. SEQUENCES.

13. GRANTING AND REVOKING PERMISSIONS.

14. NESTED QUERIES.

15. CURSORS.

16. PROCEDURES.

17. TRIGGERS.

REFERENCE BOOKS :

1. *SQL, PL/SQL Programming 3/e, 2005, Ivan Bayross, BPB Publications, New Delhi.*

2. *Database Management Systems, 3/e, 2003, Raghurama Krishnan, Johannes Gehrke, TATA McGraw Hill, Boston.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** knowledge on creating and manipulating tables using SQL .	PO1
CO2	**Analyse** the given problem and Identify suitable algorithm and data structure to solve the problem	PO2
CO3	**Design** of algorithms for the given problem specifications and **identify** the appropriate data structure to develop real time applications.	PO3
CO4	**Utilize** appropriate tools to execute the programs, and thoroughly understand the advantages and limitations of each tool.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C108: Data Base Management Syatems Lab	**C108.1**	3	-	-	-	-	-	-	-
	C108.2	-	3	-	-	-	-	-	-
	C108.3	-	-	3	-	-	-	-	-
	C108.4	-	-	-	3	-	-	-	-
	C108.5	-	-	-	-	3	-	-	-
	C108.6	-	-	-	-	-	-	3	-
	C108.7	-	-	-	-	-	-	-	3
	C108	3	3	3	3	3	-	3	3

I MCA – I SEMESTER			
COURSE CODE:	**24MCA119**	**CREDITS:**	**2**
COURSE TITLE:	**EMPLOYABILITY SKILL LAB** **(Skill Enhancement Course- 1)**	**L-T-P:**	**0-1-2**

PREREQUISITES: *No prerequisites required*

COURSE EDUCATIONAL OBJECTIVES:

CEO1: *To Learn communication skills and inter personal skills*

CEO2: *To Familiarize with SWOT analysis for self-assessment and to improve the interview skills*

CEO3: *To improve the Reasoning and Aptitude*

Module 1: Soft Skills
Communication Skills: Verbal and Non-verbal communication, Oral and Written communication and Presentation skills.
Interpersonal Skills: Understanding the importance of teamwork, Conflict resolution, andBuilding positive relationships with team members.
Practical 1
1. Just-A-Minute
2. Seminars with Power Point Presentation
3. Letter Writing

Module 2: Career Development , Workplace Etiquette
Career Development: SWOT analysis for self-assessment, Setting career goals, Resume preparation and Points to consider for effective resume writing.
Workplace Etiquette: Time Management- Importance and strategies for effective time management, Dress code, Personal grooming aspects, Office and workplace manners, Meeting etiquette.
Practical 2.
1. Prepare a resume with at least 2 references.
2. Role Play
3. Time Management

Module 3:Interview Skills:
Interview Skills: Types of Interviews, Basic interview skills, Stages of an interview, Dos and Don'ts of Interview
Group Discussions: Procedure, Dos and Don'ts of Group Discussion
Practical3
1. Group discussion
2. Mock Interviews

Module 4: Quantitative Aptitude

Number system, HCF &LCM, Ratio and Proportion, Averages, Ages, centages, Partnerships, Time, Speed and Distance, Profit and Loss, Data Interpretation, Problems based on Simple interest, Compound interest, Clocks, and Calendars.
Practical 4
List of problem to be solved based on short cuts on each topic

Module 5 : Verbal Reasoning

Verbal Reasoning: Data analysis, Data sufficiency, Decision making, coding & decoding, Blood relations, Puzzle tests, Arithmetical reasoning, Input/Output, Series and Seating arrangements.
Practical 5
List of problem to be solved based on short cuts on each topic

REFERENCE BOOKS:

1. *Barun K Mitra, Personality Development and Soft Skills, Oxford university press, New Delhi.*
2. *Gitangshu Adhikary, Communication and Corporate Etiquette, Notion Press, Mumbai.*
3. *Seema Gupta, Soft Skills- Interpersonal & Intrapersonal skills development, V&S Publishers, New Delhi.*
4. *Dr. R S Aggarwal, Quantitative Aptitude, S.Chand Publication, New Delhi.*
    Bittu Kumar, Mastering MS Office, V&S Publisher, New Delhi
5. *https://free.aicte-india.org/Quantitative-Aptitude-Basics.php*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Demonstrate** knowledge on soft skills, interview skills, career development Quantitative Aptitude, Verbal Reasoning and ITIL Framework	PO1
CO2	**Analyse** the given problem and Identify suitable method to solve the problem	PO2
CO3	**Apply**theidentified method for given problem specifications and **identify** the appropriate solution to develop real time applications.	PO3
CO4	**Utilize** appropriate tools to execute the problems, and thoroughly understand the advantages and limitations of each tool.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	**Continue** enhancing your employability skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs / COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C109: Employability Lab	**C109.1**	**3**	-	-	-	-	-	-	-
	C109.2	-	**3**	-	-	-	-	-	-
	C109.3	-	-	**3**	-	-	-	-	-
	C109.4	-	-	-	**3**	-	-	-	-
	C109.5	-	-	-	-	**3**	-	-	-
	C109.6	-	-	-	-	-	-	3	-
	C109.7	-	-	-	-	-	-	-	3
	C109	3	3	3	3	3	-	3	3

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

I MCA – II SEMESTER			
COURSE CODE:	**24MCA121**	**CREDITS:**	**4**
COURSE TITLE:	**OPERATING SYSTEMS**	**L-T-P:**	**3-1-0**

PREREQUISITES: Basic knowledge on "Computer Organization"

COURSE EDUCATIONAL OBJECTIVES:

CEO1 *To be aware of the evolution and fundamental principles of operating system, processes and their communication.*

CEO2 *To understand the various operating system components like process management and memory management.*

CEO3 *To know about file management and the distributed file system concepts in operating systems.*

CEO4 *To be aware of components of operating system with relevant case study.*

UNIT - I : OPERATING SYSTEMS INTRODUCTION	*Lecture Hrs:10*

Definition & Views of OS - Operating Systems objectives and functions - Computer System Architecture - OS Structure - OS Operations. **Evolution of Operating Systems:** Simple Batch - Multi programmed - Time-shared - Parallel - Distributed Systems - Real-Time Systems -Operating System services - User OS Interface - System Calls - Types of System Calls - System Boot.

UNIT - II : PROCESS CONCEPTS AND CPU SCHEDULING	*Lecture Hrs:12*

Process Concepts: The Process - Process State - Process Control Block - Processes & Threads. Process Scheduling Principle**:**   Scheduling Queues – Schedulers - Context Switch - Preemptive Scheduling – Dispatcher - Scheduling Criteria. **CPU Scheduling:** Scheduling algorithms –FCFS – SJF – Priority - Round Robin - Multi level Queue – Multiple processors.

UNIT - III : PROCESS COORDINATION & DEADLOCK	*Lecture Hrs:12*

Process Coordination : Synchronization Background - The Critical Section Problem - Peterson's solution - Synchronization Hardware – Semaphores - Classic Problems of Synchronization. **Deadlocks:** System Model -Deadlock Characterization - Methods for Handling Deadlocks - Deadlock Prevention - Deadlock Avoidance - Deadlock Detection and Recovery from Deadlock.

UNIT - IV: MASS STORAGE STRUCTURE & MEMORY MANAGEMENT	*Lecture Hrs:12*

Mass Storage Structure: Overview of Mass Storage Structure - Disk Structure - Disk Attachment - Disk Scheduling - Disk Management. **Memory Management:** Logical & Physical Address Space – Swapping - Contiguous Memory Allocation – Paging - Structure of Page Table – Segmentation - Page Replacement Algorithms.

UNIT - V : FILE SYSTEM	*Lecture Hrs:12*

File System   Interface: The Concept of a File - Access methods – Directory & Disk Structure - File System Mounting - File Sharing – File System Implementation.
Case Studies: The **Linux Syste**m-Linux History-Design Principles .

Windows 2000 Operating system-History-Design Principles .

TEXT BOOKS:

1. *Operating System Principles, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley Student Edition, 8/e , 2009.*
2. *Operating Systems – Internals and Design Principles, 6/e,2008, W. Stallings, Pearson Education.*

REFERENCE BOOKS:

1. *Operating Systems - A concept based Approach, 2/e, 2006,   D.M.Dhamdhere, TMH, New Delhi.*
2. *Operating Systems, 3/e, 2007, Deitel & Deitel, Pearson Education, New Delhi.*
3. *Operating Systems- A Modern Perspective, 2/e, 2002, Gary Nutt, Pearson Education.*
4. *Operating Systems-Design & Implementation,3/e, 2007, Andrew S Tanenbaum, Pearson Education, New Delhi.*
5. *Principles of Operating Systems, 1/e, 2010, V Ramesh, Laxmi Publications, New Delhi.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:	POs related to COs
CO1 **Demonstrate** the basic knowledge of operating system components and services	PO1
CO2 **Relate** the different Process concepts and CPU scheduling Algorithms	PO1,PO2,PO3, PO8
CO3 **Illustrate** the different Process Synchronization and Deadlock methodology	PO1,PO2,PO3,PO8
CO4 **Compare and Contrast** different memory management techniques	PO1,PO2,PO3, PO8
CO5 **Examine** the various File management strategies and comparative study of various operating systems	PO1,PO2,PO3, PO4,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C201: Operating Systems	C201.1	3	-	-	-	-	-	-	-
	C201.2	3	2	3	-	-	-	-	2
	C201.3	3	3	3	-	-	-	-	3
	C201.4	3	2	3	-	-	-	-	2
	C201.5	3	3	3	2	-	-	-	3
	C201	3	2.5	3	2				2.5

I MCA – II SEMESTER

COURSE CODE:	24MCA122	CREDITS:	4
COURSE TITLE:	PYTHON PROGRAMMING	L-T-P:	4-0-0

PREREQUISITES: *A Course on "C Programming or Java Programming " may be useful*

COURSE EDUCATIONAL OBJECTIVES:

CEO1: *To impart the basics of Python and its IDEs*
CEO2 : *To Understand the various Data Structures in Python*
CEO3 : *To implement Object Oriented Programming through Python.*
CEO4 *To familiarize core libraries of Python*
CEO5 *To Explore streamlit for Designing GUI*

UNIT – 1: BASICS OF PYTHON	*Lecture Hrs:8*

Python and its features, various IDEs of Python, variables and its scope, Input and Output statements, Comments, Operators,Operator Precedence, Selective statements and Iterative statements, Strings

UNIT – II: FUNCTIONS AND PYTHON DATA STRUCTURES :	*Lecture Hrs:12*

Functions and Functional Programming , Recursive Functions , Recursive Vs Iterative Functions. **Built in Data structures** – List,tuple,sets and dictionary.

UNIT – III: OBJECT ORIENTED CONCEPTS THROUGH PYTHON :	*Lecture Hrs:12*

OOPs Concepts **–** class, object, Encapsulation, Inheritance, polymorphism, Abstraction . Basic Programs on class-Object, polymorphism and Inheritance.**Explore Python Libraries** - Math and Random, Create your own Library

UNIT – IV: PANDAS AND NUMPY:	*Lecture Hrs:12*

Introduction to pandas Data Structure, Essential functionality – Reindexing, Indexing ,selection and filtering, reshaping, summarizing and computing descriptive statistics, handling missing data, filter and query methods, grouping, reading and writing data in text format – read_csv,read_table. NumPy Basics- creating Arrays, universal functions – Basic unary and binary functions , File Input and Output with arrays – saving and loading text files, Linear Algebra – commonly used linalg functions

UNIT – V: STREAMLIT -TO DEVELOP AN GUI :	*Lecture Hrs:12*

What is Streamlit, Features of Streamlit, Text and Table elements – Text Elements, Titles, Headers, Subheaders ,markdowns, tables, dataframes, Buttons and sliders – Buttons, RadioButton, Checkbox, Dropdown ,Multiselect, Progress bar, Slidder, Forms, Develop an Streamlit Application

TEXT BOOKS

1. *Charles Dierbach, "Introduction to Computer Science using Python: A Computational Problem-Solving Focus", Wiley India Edition, 2016.*
2. *"Core Python Programming ",Wesley J chun,2e,2012.*
3. *John V. Guttag., "Introduction to computation and programming using python: with applications to understanding data", PHI Publisher, 2016.*
4. *John Hunt, "A Beginners Guide to Python 3 Programming", Springer Publisheers,2020*

REFERENCE BOOKS

1. *"Python for Data Analysis", wesMckinney,o'Reilly,2012*
2. *"Beginner's Guide to Streamlit with Python: Build Web-Based Data andMachine Learning Applications", Sujay Raghavendra,Dharwad, Karnataka, India,Apress,2023,*
3. *Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", Second Edition, 2016*
4. *Charles Severance, "Python for everybody: exploring data in Python 3", Creative CommonsAttribution-Non Commercial Share Alike 3.0 Unported License, 2016.*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Learn and Execute** basic Python concepts	PO1,PO2
CO2	**Analyze** various Python Functions and Data Structures	PO1,PO2,PO3,PO8
CO3	**Experiment** Object Oriented Programming concepts in python	PO1,PO3, PO8
CO4	**Explore** various core Python Libraries	PO1,PO2 ,PO3,PO4,PO8
CO5	**Develop** an GUI using Streamlit	PO1,PO3,PO4, PO8

CO-PO MAPPING (DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course POs COs		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C202: Python Programming	C202.1	3	2	-	-	-	-	-	-
	C202.2	3	3	3	-	-	-	-	3
	C202.3	3	-	3	-	-	-	-	2
	C202.4	3	3	2	3	-	-	-	3
	C202.5	3	-	3	3	-	-	-	2
	C202	3	2.67	2.75	3	-	-	-	2.5

I MCA – II SEMESTER			
COURSE CODE:	**24MCA123**	**CREDITS:**	**4**
COURSE TITLE:	**FULL STACK WEB DEVELOPMENT**	**L-T-P:**	**4-0-0**

PREREQUISITES: *A course on "Java Programming"*

COUSE EDUCATIONAL OBJECTIVES :

> **CEO1** :*To understand the fundamentals of web programming and client side scripting.*
>
> **CEO2 :** *To learn server side development using NodeJS.*
>
> **CEO3 :** *To understand API development with Express Framework.*
>
> **CEO4 :***To learn the advanced client side scripting and ReactJS framework*
>
> **CEO5 :** *To understand and architect databases using MongoDB and SQL databases*

UNIT- I: OVERVIEW OF HTML AND CSS:	*Lecture Hrs :12*

HTML5: Introduction to HTML5, Browsers and HTML5, Editor's Offline and Online, Tags, Attribute and Elements, Doctype Element, Comments, Headings, Paragraphs, and Formatting Text, Lists and Links, Images and Tables CSS: Introduction CSS, Applying CSS to HTML5, Selectors, Properties and Values, CSS Colors and Backgrounds, CSS Box Model, CSS Margins, Padding, and Borders, CSS Text and Font Properties, CSS General Topics

UNIT- II: OVERVIEW OF JAVASCRIPT	*Lecture Hrs :12*

JAVASCRIPT: Introduction to JavaScript, Applying JavaScript (internal and external), Understanding JS Syntax, Introduction to Document and Window Object, Variables and Operators, Data Types and Num Type Conversion, Math and String Manipulation, Objects and Arrays, Date and Time, Conditional Statements, Switch Case, Looping in JS and Functions.

UNIT- III: REACT JS:	*Lecture Hrs :12*

Introduction, Templating using JSX, Components, State and Props, Lifecycle of Components, Rendering List and Portals, Error Handling, Routers, Redux and Redux Saga, Immutable.js, Service Side Rendering, Unit Testing, Webpack.

UNIT- IV: NODE JS	*Lecture Hrs :12*

NodeJS: NodeJS Overview, NodeJS - Basics and Setup, NodeJS Console, NodeJS Command Utilities, NodeJS Modules, NodeJS Concepts, NodeJS Events, NodeJS with ExpressJS, NodeJS Database Access.

UNIT- V: MONGO DB	*Lecture Hrs :12*

MongoDB: SQL and NoSQL Concepts Create and Manage MongoDB, Migration of Data into MongoDB, MongoDB with ReactJS, MongoDB with NodeJS, Services Offered by MongoDB.

TEXT BOOKS:

1. Vasan Subramanian, "Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node," Apress, 2nd Edition, 2019.
2. Kogent Learning Solutions Inc., "Web Technologies Black Book," Dreamtech Press, 2011.

REFERENCE BOOKS:

1. Brad Dayley, "Node.js, MongoDB, and AngularJS Web Development," Second Edition, 2018.
2. Uttam K Roy, "Web Technologies," Oxford University Press, 2010.

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	Demonstrate knowledge on HTML5, CSS to design look and feel of the web applications.	PO1,PO3
CO2	Design and build the web applications using JavaScript Programming.	PO1, PO2,PO3,PO4
CO3	Apply ReactJS Framework to design and develop user Interfaces and rapid frontend web applications for society as well as Enterprise	PO1,PO2,PO3
CO4	Analyze NodeJS tool Utilities and modules to implement back-end applications.	PO1,PO3
CO5	Apply MongoDB to design and organize the database for development of Web Applications.	PO1,PO2, PO3, PO4,PO6,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs / COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C203: Full Stack Web Development	**C203.1**	3	-	2	-	-	-	-	-
	C203.2	3	2	3	2	-	-	-	-
	C203.3	3	3	3	-	-	-	-	-
	C203.4	3	-	3	-	-	-	-	-
	C203.5	3	3	3	3	-	2	-	2
	C203	3	2.	2.8	2.5	-	2	-	2

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA DEPARTMENT

I MCA – II SEMESTER			
COURSE CODE:	**24MCA124A**	**CREDITS:**	**3**
COURSE TITLE:	**ARTIFICIAL INTELLIGENCE** **(Professional Elective-I)**	**L-T-P:**	**3-0-0**

PREREQUISITES: Knowledge on Mathematical logic, Problem solving techniques, Knowledge representation and Learning Techniques may be helpful.

COURSE EDUCATIONAL OBJECTIVES:

CEO1 *To familiarize students with Artificial Intelligence techniques for building well-engineered and efficient intelligent systems.*

CEO2 *In the applied point of view, some cutting edge applications of these systems will also be discussed.*

CEO3 *To have an appreciation and understanding of both the achievements of AI and the theory underlying those achievements.*

CEO4 *To have an appreciation for the engineering issues underlying the design of AI systems.*

CEO5 *To have a basic proficiency in a traditional AI language including an ability to write simple to intermediate programs and an ability to understand code written in that language.*

CEO6 *To have a basic understanding of some of the more advanced topics of AI such as Learning.*

UNIT - I: INTRODUCTION:	*Lecture Hrs:8*

What is AI? - The History of Artificial Intelligence - The State of the Art. **Intelligent Agents**: Agents& Environments – Good Behavior: The Concept of Rationality –The Nature of Environments - Structure of Agents.

UNIT - II:SOLVING PROBLEMS BY SEARCHING:	*Lecture Hrs:12*

Problem Solving Agents – Example Problems- Searching for Solutions-Uninformed Search Strategies - Informed (Heuristic) Search Strategies - Heuristic Functions.

Beyond Classical Search: Local Search Algorithms and Optimization Problems- Local Search in Continuous Spaces- Searching with Nondeterministic Actions- Searching with Partial Observations .

UNIT – III: CONSTRAINT SATISFACTION PROBLEMS	*Lecture Hrs:12*

: Defining Constraint Satisfaction Problems- Constraint Propagation: Inference in CSPs- Backtracking search for CSPs.

Logical Agents: Knowledge–Based Agent - The Wumpus World – Logic - Propositional Logic: a Very Simple Logic - Propositional Theorem Proving - Effective Propositional Model Checking - Agents Based on Propositional Logic.

UNIT – IV FIRST ORDER LOGIC:	*Lecture Hrs:12*

Syntax and Semantic of First-Order Logic - Using First-Order Logic - Knowledge Engineering in First-Order Logic.

Inference in First Order Logic

Propositional Vs First Order Inference-Unification and Lifting-Forward Chaining-Backward Chaining-Resolution.

UNIT - V KNOWLEDGE REPRESENTATION:	*Lecture Hrs:12*

Ontological Engineering - Categories and Objects - Events- Reasoning Systems for Categories - Reasoning with Default Information - The Internet Shopping World.

Quantifying Uncertainty: Acting Under Uncertainty - Basic Probability Notation - Inference Using Full

Joint Distributions – Independence - Bayes' Rule and Its Use.

TEXT BOOKS:

1. *Artificial Intelligence A Modern Approach, 2015, Third Edition , Stuart J. Russell and Peter Norvig Pearson Education.*

REFERENCE BOOKS:

1. *Artificial Intelligence, 3/e,2009, Elaine Rich, Kevin Knight and Shiva shankar B Nair Tata McGraw Hill.*
2. *Artificial Intelligence-Structures and Strategies for Complex Problem Solving, 5/e, 2009, George F. Luther, Pearson Education.*
3. *Introduction to Artificial Intelligence, Eugene Charniak and Drew McDermott, Pearson   Education, 1987.*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Explain** the key characteristics and structure of intelligent agents	PO1,PO2,PO3
CO2	**Solve** search problems by applying a suitable search strategy.	PO1,PO2,PO3, PO4, PO8
CO3	**Design** of an intelligent agent using propositional logic and first order logic to solve reasoning problems	PO1,PO2,PO3,PO8
CO4	**Construct** a knowledge representation system using logic and ontological engineering to facilitate inference in the given problem domain	PO1,PO2,PO3,PO4, PO8
CO5	**Construct** a knowledge base for uncertain knowledge inference using probability distribution and solving problems	PO1,PO2,PO3,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C204: Artificial Intelligence	C204.1	3	3	2	-	-	-	-	-
	C204.2	3	3	2	2	-	-	-	2
	C204.3	3	2	3	-	-	-	-	3
	C204.4	3	3	3	2	-	-	-	3
	C204.5	3	3	3	-	-	-	-	2
	C204	3	2.8	2.6	2				2.5

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)
MCA   DEPARTMENT

I MCA – II SEMESTER			
COURSE CODE:	**24MCA124B**	**CREDITS:**	**3**
COURSE TITLE:	**DIGITAL IMAGE PROCESSING** (Professional Elective-I)	**L-T-P:**	**3-0-0**

PREREQUISITES: *A course on " Computer Graphics".*

COURSE EDUCATIONAL OBJECTIVES*:*

CEO1: Learn digital image fundamentals.

CEO2: Be exposed to simple image processing techniques.

CEO3: Learn to represent image enhancement in the spatial and frequency domain

CEO4: Be familiar with image segmentation and compression techniques

UNIT-I: DIGITAL IMAGE FUNDAMENTALS	*Lecture Hrs:10*

Elements of visual perception, Image Acquisition Systems, Sampling and Quantization, Image Formation, Image Geometry, Different types of digital images. Relationship between pixels, Basic concepts of distance transform, Color Image fundamentals-RGB-HIS Models, Different color models-conversion.

UNIT-II :IMAGE TRANSFORMS	*Lecture Hrs:12*

1D Discrete Fourier Transform (DFT), 2D transforms – DFT, Discrete Cosine Transform, Walsh and PCA

UNIT III:IMAGE ENHANCEMENT	*Lecture Hrs:12*

Gray Level transformations, Histogram Equalization, Spatial Domain: Basics of Spatial Filtering: smoothing and sharpening spatial filters. Frequency domain: smoothing and sharpening frequency domain filters, Ideal, Gaussian filters.

UNIT-IV: IMAGE SEGMENTATION AND FEATURE EXTRACTION	**Lecture Hrs:12**

Segmentation: Point detection, line detection, edge detection, Region based segmentation, Region Splitting and Merging Technique. Thresholding Techniques: multilevel thresholding, optimal thresholding using Bayesian classification. Feature Extraction: GLCM, Hough Transform, Morphological operation

UNIT-V :IMAGE COMPRESSION	**Lecture Hrs:10**

Lossy and lossless compression schemes, prediction based compression schemes, sub-band encoding schemes, JPEG compression standard, Fractal compression scheme, Wavelet compression scheme

TEXT BOOKS

1. Rafael C.Gonzalez and Richard E.Woods, "Digital Image Processing", 4th Edition, Pearson Education, New Delhi, 2018

REFERENCE BOOKS

1. Jain Anil K.,"Fundamentals of Digital Image Processing", 1st Edition, Prentice Hall of India, New Delhi, 2010.

2. Kenneth R.Castleman, "Digital Image Processing", 1 st Edition, Prentice Hall of India, New Delhi, 2006.

3. John C.Russ, "The Image Processing Handbook", 5thEdition, Prentice Hall, New Jersey, 2002.

4. Willliam K Pratt, "Digital Image Processing", 3rd Edition, John Willey,2002.

5. Dr.S.Sridhar, Digital Image Processing, Second Edition, Oxford University Press, 2016.

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Digitize** the input image using appropriate sampling and quantizing techniques	PO1, PO2
CO2	**Transform** the input images to various domains and classify the images	PO1, PO2, PO3, PO4
CO3	**Enhance** the images using spatial domain and frequency domain for better visual representation	PO1, PO2, PO3, PO4, PO8
CO4	To **extract** the features of a image by applying Morphological Image Processing techniques.	PO1, PO2, PO3, PO4, PO8
CO5	**Analyze** the different image compression techniques and its significance	PO1, PO2,PO3, PO4, PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs** **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C205: Digital Image Processing	**C205.1**	3	2	-	-	-	-	-	-
	C205.2	3	3	3	2	-	-	-	-
	C205.3	3	3	3	2	-	-	-	2
	C205.4	3	3	2	3	-	-	-	2
	C205.5	3	3	3	3	-	-	-	2
	C205	3	2.8	2.75	2.5	-	-	-	2

I MCA – II SEMESTER			
COURSE CODE:	**24MCA124C**	**CREDITS:**	**3**
COURSE TITLE:	**CYBER SECURITY** (Programme Elective-I)	**L-T-P:**	**3-0-0**

PREREQUISITES: *A course on "Computer Networks"*

COUSE EDUCATIONAL OBJECTIVES :

    CEO1. *To understand the Computer Security and threats*

    CEO2. *To Study the concepts of Browser Attacks, Privacy Impacts of Emerging Technologies.*

    CEO3. *To learnManaging the incidents.*
    CEO4. *To learnComputer Forensics technologies and Cyber Crimes.*
    CEO5. *To study the* Computer Forensic Evidences and Investigations

UNIT- I: CYBER SECURITY	**Lecture Hrs:10**

Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control and Cryptography, Web User Side, Browser Attacks, Web attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

UNIT- II: PRIVACY IN CYBERSPACE	**Lecture Hrs:12**

Privacy Concepts ,Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.

UNIT- III: MANAGEMENT AND INCIDENTS	**Lecture Hrs:10**

Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster, Emerging Technologies, The Internet of Things, Economics, Electronic Voting, Cyber Warfare, Cyberspace and the Law, International Laws, Cyber Warfare and Home Land Security.

UNIT- IV: COMPUTER FORENSICS TECHNOLOGY AND CYBERCRIME	**Lecture Hrs:12**

Computer Forensics fundamentals , Use of computer Forensics in Law Enforcement, Computer Forensics Assistance to Human Resources/Employment Proceedings, Computer Forensics Services, Benefits of Professional Forensics Methodology, Steps taken by Computer Forensics Specialists, Types of Military Computer Forensic Technology, Types of Law Enforcement - Computer Forensic Technology, Types of Business Computer Forensic Technology, occurrence of Cybercrime, Cyber Detectives, Cyber Crime with risk management techniques.

UNIT- V: COMPUTER FORENSICS EVIDENCE AND TOOLS	**Lecture Hrs:12**

Importance of Collecting Evidence, Collection Options, Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination- The Chain of Custody; Duplication and preservation of digital evidence- Preserving the digital crime scene; Computer evidence processing steps; Forensic Card Reader, Cell Seizure, MOBILedit, Forensic SIM, WinHex. Total Periods: 55 Topics for self-study are provided in the lesson plan.

TEXT BOOKS

1. *Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, "Security in Computing," 5th Edition, Pearson Education, 2015.*
2. *John R.Vacca, "Computer Forensics, Computer Crime Scene Investigation", Firewall Media, 2009.*

REFERENCE BOOKS:

1. *George K.Kostopoulous, "Cyber Space and Cyber Security," CRC Press, 2013.*
2. *MarttiLehto, PekkaNeittaanmäki, "Cyber Security: Analytics, Technology and Automation", Springer International Publishing Switzerland, 2015.*
3. *Bill Nelson, Amelia Phillips, Christopher Steuart, "Guide to Computer Forensics and Investigations", Cengage Learning,4 th Edition, 2009.*
4. *Chris Prosise, Kevin Mandia, "Incident Response and Computer Forensics", McGraw-Hill Osborne Media, 2nd Edition, July 2003.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:	POs related to COs
CO1 Understand the concepts of Threats, Harm, Vulnerabilities, Computer Forensics Fundamentals and Forensics evidences for providing Cyber Security.	PO1,PO3
CO2 Analyze Internet of Things, Economics, Electronic Voting, Cyber Warfare and privacy impacts of emerging techniques to identify the critical issues.	PO1, PO2,PO3
CO3 Use Forensic SIM, WinHex and forensic techniques to acquire and verify the evidence.	PO1,PO2,PO4
CO4 Commit ethics of cyber regulations, responsibilities, and norms to manage incidents using privacy principles, policies,	PO1,PO2, PO7
CO5 Cyber Welfare and International Laws to adapt in cyberspace and follow law of enforcement standards for digital Forensics and crime investigations.	PO1,PO2, PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)								
Course \ POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C206.1	3	-	2	-	-	-	-	-
C206.2	3	2	3	-	-	-	-	-
C206.3	3	3	-	2		-	-	-
C206.4	3	-	-	-		-	2	-
C206.5	3	3	2	-		-	-	2
C206	3	2.67	2.33	2	-	-	2	2

(Course column: C206: Cyber Security)

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

I MCA – II SEMESTER			
COURSE CODE:	**24MCA125A**	**CREDITS:**	**3**
COURSE TITLE:	**DATA MINING AND BUSINESS INTELLIGENCE** (Professional Elective-II)	**L-T-P:**	**3-0-0**

PREREQUISITES: *A course on "Data Base Management System & Artificial Intelligence"*

COUSE EDUCATIONAL OBJECTIVES :

> *CEO1. Understanding of the importance of data mining and the principles of business intelligence*

> *CEO2. To prepare data usingpre-processing techniques*

> *CEO3. To Describing key business intelligence terms*

> *CEO4. Determining the relevance of data to business*

> *CEO5. Aligning business intelligence to organizational strategy*

UNIT- I: INTRODUCTION	Lecture Hrs:10

Why reporting and Analysing data, Raw data to valuable information-Lifecycle of Data - What is Business Intelligence - BI and DW in today's perspective - What is data warehousing - The building Blocks: Defining Features - Data warehouses and data 1marts - Overview of the components - Metadata in the data warehouse - Need for data warehousing - Basic elements of data warehousing - trends in data warehousing

UNIT- II: BI AND DW ARCHITECTURES	Lecture Hrs:12

BI and DW architectures and its types - Relation between BI and DW - OLAP (Online analytical processing) definitions - Difference between OLAP and OLTP - Dimensional analysis - What are cubes? Drill-down and roll-up - slice and dice or rotation - OLAP models - ROLAP versus MOLAP - defining schemas: Stars, snowflakes and fact constellations

UNIT- III:ISSUES IN DM – KDD PROCESS	Lecture Hrs:12

Motivation for Data Mining - Data Mining-Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process

UNIT- IV: DATA PRE-PROCESSING	Lecture Hrs:12

Why to pre-process data? - Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation, Dimensionality reduction - Data Compression - Numerosity Reduction - Data Mining Primitives - Languages and System Architectures: Task relevant data - Kind of Knowledge to be mined - Discretization and Concept Hierarchy.

UNIT- V: DATA GENERALIZATION AND SUMMARIZATION	Lecture Hrs:12

What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons Association Rule Mining: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm - generating rules – Improved Apriori algorithm – IncrementalARM – Associative Classification – Rule Mining

TEXT BOOKS:

1. J. Han, M. Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann
2. M. Kantardzic, "Data mining: Concepts, models, methods and algorithms, John Wiley &Sons Inc.

REFERENCE BOOKS:

1. PaulrajPonnian, "Data Warehousing Fundamentals", John Willey.

2. M. Dunham, "Data Mining: Introductory and Advanced Topics", Pearson Education.

3. G. Shmueli, N.R. Patel, P.C. Bruce, "Data Mining for Business Intelligence: Concepts, Techniques, and Applications in Microsoft Office Excel with XLMiner", Wiley India

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Demonstrate** an understanding of the importance of data mining and the principles of business intelligence	PO1,PO2
CO2	**Understand** the BI and DW architectures and its types , Understanding the OLAP models	PO2,PO2, PO3
CO3	**Define and apply** metrics to measure the performance of various data mining algorithms	PO1,PO2,PO3
CO4	**Organize and Prepare** the data needed for data mining using pre preprocessing techniques	PO1,PO2, PO3, PO4
CO5	**Apply** BI to solve practical problems : Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.	PO1,PO2, PO4,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs** **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C207: Data Mining and Business Intelligence	**C207.1**	3	2	-	-	-	-	-	-
	C207.2	3	3	3	-	-	-	-	-
	C207.3	3	3	2	-	-	-	-	-
	C207.4	3	3	2	2	-	-	-	-
	C207.5	3	2	-	2	-	-	-	2
	C207	3	2.6	2.3	2	-	-	-	2

I MCA – II SEMESTER			
COURSE CODE:	**24MCA125B**	**CREDITS:**	**3**
COURSE TITLE:	**CLOUD COMPUTING** (Professional Elective-II)	**L-T-P:**	**3-0-0**

PREREQUISITES: A Course on "Computer Networks".

COURSE EDUCATIONAL OBJECTIVES:

CEO1	*To explore the Basics of Cloud Computing.*
CEO2	*To Learn about Cloud Computing Technology.*
CEO3	*To Explore Common Standards in Cloud Computing.*
CEO4	*To Explore Cloud Service Providers.*
CEO5	*To understand Business Case for Going to the Cloud.*

UNIT - I: CLOUD COMPUTING BASICS	**Lecture Hrs:10**

Cloud Computing Overview – What is Cloud Computing, Cloud Components, Infrastructure-Grid Computing, Full Virtualization, Para virtualization, Services-Software as a service, Platform as a Service, Hardware as a Service, First Movers in the Cloud, When you can use cloud computing, Benefits, Limitations, Security Concerns.

UNIT - II :CLOUD COMPUTING TECHNOLOGY	**Lecture Hrs:12**

Hardware and Infrastructure:Clients, Security, Network, Services; Accessing the Cloud: Platforms, Web Applications, Web APIs, Web Browsers; Cloud Storage: Overview, Cloud Storage Providers; Standards: Application, Client, Infrastructure, Service

UNIT - III:COMMON STANDARDS IN CLOUD COMPUTING - END USER ACCESS TO CLOUD COMPUTING	**Lecture Hrs:12**

The open cloud consortium - The distributed management task force - Standards for application developers - Standards for messaging - Standards for security - YouTube - Facebook –What is Smartphone- - Smartphone - Mobile operating systems for smart phones - Mobile platform virtualization.

UNIT - IV:CLOUD COMPUTING WITH THE TITANS	**Lecture Hrs:10**

Google-Google APP Engine, Google Web Toolkit, Microsoft-Azure Services Platform, Windows Live, Exchange Online, Sharepoint Services, Microsoft Dynamics CRM, Amazon-Amazon Elastic Compute Cloud(Amazon EC2), Amazon SimpleDB, Amazon Simple Storage Service(Amazon s3),Amazon Simple Queue Service(Amazon SQS), Salesforce.com-Force.com, Salesforce.com CRM, AppExchange.

UNIT - V:A BUSINESS CASE STUDY	**Lecture Hrs:8**

The Business Case for Going to the Cloud: Cloud Computing Services, How Those Applications Help Your Business, Deleting Your Datacenter, Salesforce.com, Thomson Reuters

TEXT BOOKS:

1.   *"Cloud Computing implementation, management and security", 1/e, 2009, John W. Rittinghouse, James*

F. Ransome, CRC Press, Taylor & Francis group, US.

2. *"Cloud Computing: A practical approach", 1/e, 2009, Anthony T.velte, Toby J.velte Robert Elsenpeter, Tata Mc Graw Hill edition, India.*

REFERENCE BOOKS

1. *"Cloud Computing: Principles and Paradigms ", 1/e, 2013, Rajkumar Buyya, James Broberg and Andrzej Goscinski , Wiley Pvt. Ltd., India.*
2. *"Cloud Computing: Concepts, Technology & Architecture ", 1/e, 2013, Thomas Erl, Ricardo Puttini and Zaigham Mahmood , PHI, New Delhi.*
3. *"Cloud Application Architectures", 1/e, 2009, George Reese, Oreilly publishers, California.*
4. *"Cloud Computing and SOA convergence in your enterprise", 1/e, 2010, David S. Linthicum, Addison-Wesley, Boston, US.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Articulate** the main concepts, key technologies, strengths, and limitations of cloud computing	PO1,PO2
CO2	**Conceptualize** Hardware and Infrastructure requirements and Understand what are the techniques for cloud storage.	PO1,PO2,PO3
CO3	**Understand** the standards for security, messaging and applications, and also end user accessibility to cloud.	PO1,PO2
CO4	**Aware** the various services provided by big titans of cloud computing	PO1,PO2,PO3 PO8
CO5	**Illustrate** business case for going to cloud andhow those applications helps the Business	PO1,PO2,PO3, PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C208: Cloud Computing	C208.1	2	3		-	-	-	-	-
	C208.2	3	2	3	-	-	-	-	-
	C208.3	3	2	-	-	-	-	-	-
	C208.4	3	3	2	2	-	-	-	2
	C208.5	3	3	3	-	-	-	-	2
	C208	2.8	2.6	2.67	2				2

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

I MCA – II SEMESTER			
COURSE CODE:	**24MCA125C**	**CREDITS:**	**3**
COURSE TITLE:	**MOBILE APPLICATIONS USING ANDROID** (Professional Elective-II)	**L-T-P:**	**3-0-0**

PREREQUISITES: *Courses on "Object Oriented Programming through JAVA" and " Operating Systems".*

COURSE EDUCATIONAL OBJECTIVES:

CEO1 *To get awareness about Basic Structure of Android OS with suspect to Mobile Applications, Mobile devices and Tools.*

CEO2 *To get awareness about various components and uses interface, services and Databases*

CEO3 *To make the students to learn how to create mobile applications.*

UNIT - I : INTRODUCTION	Lecture Hrs:10

Background, Android: An Open platform for mobile development, Native Android Applications, Android SDK Features, Open Handset Alliance, Why Develop for Mobile and Android, Development Framework, Types of Android Applications, Developing for Mobile and Embedded Devices, Android Development Tools.

UNIT - II : CREATING APPLICATIONS	Lecture Hrs:12

Application Manifest File, Using Manifest Editor , Externalizing Resources, Android Application Life Cycle, Application Priority and its States, Android Application Class, Android Activities.

UNIT - III : BUILDING USER INTERFACES & DATABASES	Lecture Hrs:12

Fundamental Android UI Design, Layouts, Fragments, Creating new Views, Adaptors, Android Database, SQLite, Content Values and Cursors, Working with SQLite Databases.

UNIT – IV: CONTENT PROVIDERS & SERVICES	Lecture Hrs:12

Creating & Using Content Providers, Adding search to your Application, Native Android Content Provider, Introducing services, Using Background Threads, Using Alarms.

UNIT - V : ANDROID COMPONENTS	Lecture Hrs:12

Action Bar, Menus & Action Bar Action Items, Dialogs, Notification, Designing, Collection view Widgets, Live Folders, Quick Search Box, Creating Application Widgets.

TEXT BOOK

1. *Professional Android 4 Application Development, 2012, Reto Meier, Wiley India.*

REFERENCE BOOKS

1. *Android Studio Development Essentials, 2014, Neil Smyth, Techopedia.*
2. *Android Programming Succinctly, 2014, Ryon Hodson, Syncfusion Inc.*

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COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Understand** the basic structure of Android operating system.	PO1,PO2
CO2	**Demonstrate** the creation of mobile applications.	PO1,PO2, PO3 PO4,PO7,PO8
CO3	**Interpret** the database design concepts for different mobile applications.	PO1,PO2, PO3
CO4	**Enumerate** the different services applied for mobile application development.	PO1,PO3, PO3
CO5	**Compare** various components and its uses for mobile application development.	PO1,PO2, PO3, PO7, PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	COs \ POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C209: Mobile Applications using Android	C209.1	3	3	-	-	-	-	-	-
	C209.2	3	3	3	2	-	-	2	3
	C209.3	3	2	2	-	-	-	-	-
	C209.4	3	2	2	-	-	-	-	-
	C209.5	3	2	2	-	-	-	2	3
	C209	3	2.4	2.25	2			2	3

I MCA – II SEMESTER			
COURSE CODE:	**24MCA126**	**CREDITS:**	**2**
COURSE TITLE:	**PYTHON PROGRAMMING LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: *Courses on "Programming using Python"*

COURSE EDUCATIONAL OBJECTIVES:
   CEO1 :To Learn Basic Logics using Python
   CEO2:To Explore Python Functions and data Structures
   CEO3:To Understand Oops Through Python
   CEO4:To Explore various Libraries and Streamlit

Exercise 1: Write and Execute a Python Program
   a) To Perform Arithmetic Operations
   b) To find Sum and Product of N Numbers
   c) To Check Given Number is Even or Odd
   d) To print Even and Odd Numbers from 1 To N
   e) To print Number of Even's and Odd's from 1 To N
   f) To print sum of Even and Odd Numbers from 1 To N
   g) To find Sum of Individual Digits of a Given Number
   h) To print the Given Number in Reverse
   i) To Print nth Fibonacci Number

Exercise 2: Write and Execute a Python Program
   a) To check Given Number is Prime or Not
   b) To Print Prime Numbers from 1 To N
   c) To check Given Number is Armstrong Number or Not
   d) To check the Given Number is Perfect or Not
   e) To check given Number is Harshad Number or not
   f) To Print various patterns

Exercise 3:Write a Python Program
   a) To create a List and illustrate the methods of List
   b) To create a Tuple and illustrate the methods of Tuple
   c) To create a Set and illustrate the methods of Set
   d) To create a Dictionary and illustrate the methods of Dictionary

Exercise 4:Write a Python Program to Illustrate
   a) Function with Arguments
   b) Functions with No Arguments
   c) Functions with Return Type
   d) Functions with no return Type

Exercise 5:Write a python program
   a) Create a string made of the middle three characters of the given 2 strings
   b) Arrange string characters such that lowercase letters should come first
   c) Write a program to count occurrences of all characters within a string
   d) Reverse a given string
   e) Split a string on hyphens
   f) Find the last position of a given substring
   g) Replace each special symbol with # in the following string

Exercise 6:Write a python program to illustrate
   a) Class-object
   b) Overloading
   c) Inheritance-Single, Hierarchical, Multilevel

Exercise 7:Write a python program to illustrate
   a) Built in modules like random, math
   b) Create your own module

Exercise 8:ExploringPandas
   a) Indexing and slicing
   b) Filters
   c) Grouping and Aggregation
   d) Handling Missing Data
   e) File handling with Pandas

Exercise 9:Numpy
   a) Matrix Operation
   b) Reshaping and Resizing
   c) Commonly used linalg functions

Exercise 10:Python GUI libraries – Streamlit
   a) Develop a small Calculator application which performs add, subtract,multiply and division
   b) Develop an Employee Payroll Application

Develop a Student Result Application

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Demonstrate** knowledge on writing basic Python Programs using various python Data Structures	PO1
CO2	**Analyse** the given problem and Identify suitable OOPs concept to solve the problem	PO2
CO3	**Design**the User Interface for developing real time application using Streamlit.	PO3
CO4	**Utilize** appropriate python tools like pandans ,numpy to execute the programs, and thoroughly understand the advantages and limitations of each tool.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C210: Python Programming Lab	C210.1	3	-	-	-	-	-	-	-
	C210.2	-	3	-	-	-	-	-	-
	C210.3	-	-	3	-	-	-	-	-
	C210.4	-	-	-	3	-	-	-	-
	C210.5	-	-	-	-	3	-	-	-
	C210.6	-	-	-	-	-	-	3	-
	C210.7	-	-	-	-	-	-	-	3
	C210	3	3	3	3	3	-	3	3

I MCA – II SEMESTER			
COURSE CODE:	**24MCA127**	**CREDITS:**	**2**
COURSE TITLE:	**FULL STACK WEB DEVELOPMENT LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: *A Course on " Java Programming"*

COURSE EDUCATIONAL OBJECTIVES:

> **CEO1:** *To implement the client side of the web application using javascript.*
>
> **CEO2:** *To understand Javascript on the desktop using NodeJS.*
>
> **CEO3:** *To develop a web application using NodeJS and Express*
>
> **CEO4:** *To implement a SPA using React*
>
> **CEO5:** *To develop a full stack single page application using React, NodeJS, and a Database*

LIST OF EXPERIMENTS

1. Create a form and validate the contents of the form using JavaScript.

2. Get data using Fetch API from an open-source endpoint and display the contents in the form of a card.

3. Create a NodeJS server that serves static HTML and CSS files to the user without using Express.

4. Create a NodeJS server using Express that stores data from a form as a JSON file and displays it in another page. The redirect page should be prepared using Handlebars.

5. Create a NodeJS server using Express that creates, reads, updates and deletes students' details and stores them in MongoDB database. The information about the user should be obtained from a HTML form.

6. Create a NodeJS server that creates, reads, updates and deletes event details and stores them in a MySQL database. The information about the user should be obtained from a HTML form.

7. Create a counter using ReactJS

8. Create a Todo application using ReactJS. Store the data to a JSON file using a simple NodeJS server and retrieve the information from the same during page reloads.

9. Create a simple Sign up and Login mechanism and authenticate the user using cookies. The user information can be stored in either MongoDB or MySQL and the server should be built using NodeJS and Express Framework.

10. Create and deploy a virtual machine using a virtual box that can be accessed from the host computer using SSH.

11. Create a docker container that will deploy a NodeJS ping server using the NodeJS image.

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	To implement and deploy the client side of the web application.	PO1
CO2	To develop and deploy server side applications using NodeJS.	PO2
CO3	To use Express framework in web development	PO3
CO4	To implement and architect database systems in both MongoDB and MySQL environments.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs\COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C211: Full Stack Web Development Lab	C211.1	3	-	-	-	-	-	-	-
	C211.2	-	3	-	-	-	-	-	-
	C211.3	-	-	3	-	-	-	-	-
	C211.4	-	-	-	3	-	-	-	-
	C211.5	-	-	-	-	3	-	-	-
	C211.6	-	-	-	-	-	-	3	-
	C211.7	-	-	-	-	-	-	-	3
	C211	3	3	3	3	3	-	3	3

I MCA – II SEMESTER			
COURSE CODE:	**24MCA128**	**CREDITS:**	**2**
COURSE TITLE:	**LINUX PROGRAMMING LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: *Course with title " Operating Systems" may be helpful.*

COURSE EDUCATIONAL OBJECTIVES:

    CEO1: *To Practice Basic Lnix Commands*

    CEO2 : *To Explore various types of File and its commands*

    CEO3: *To Understand the file editing through vi editor*

Practice the Following commands in LINUX

1. Entering commands.

2. Common Commands for Files and Directories

3. SearchingFiles

4. MoreaboutListingFiles

5. PermissionCommands

6. Commands for viewing Long Files, to Print Files

7. Editing with vi Editor

8. Finding Patterns in Files

9. Compressing and Packing Files

10. Counting Lines, words and File Size

11. Working with Columns and Fields

12. Sorting the Contents of Files

13. Comparing Files

14. Editing and Formatting Files

15. Working with Dates and Times

16. Performing Mathematical Calculations.

17. Standard input and Output (Redirection Commands)

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COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** knowledge on basic Unix commandsto work with an unix based applications	PO1
CO2	**Analyse** the given problem and Identify suitable commands to solve the problem	PO2
CO3	**Design**the steps by step procedure to solve any unix based applications	PO3
CO4	**Utilize** appropriate tools like vi , bcc to solve many real time applications	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C212: Linux ProgrammingLab	**C212.1**	**3**	-	-	-	-	-	-	-
	C212.2	-	**3**	-	-	-	-	-	-
	C212.3	-	-	**3**	-	-	-	-	-
	C212.4	-	-	-	**3**	-	-	-	-
	C212.5	-	-	-	-	**3**	-	-	-
	C212.6	-	-	-	-	-	-	3	**-**
	C212.7	-	-	-	-	-	-	-	3
	C212	3	3	3	3	3	-	3	3

I MCA – II SEMESTER			
COURSE CODE:	**24MCA129**	**CREDITS:**	**2**
COURSE TITLE:	**DATA VISUALIZATION USING POWER BI** (Skill Enhancement Course- II)	**L-T-P:**	**0-1-2**

PREREQUISITES: *Course with title " Data Mining and Business Intelligence" may be helpful.*

COURSE EDUCATIONAL OBJECTIVES:

CEO1: *Effective use of Business Intelligence (BI) technology to apply data visualization*

CEO2 *: To discern patterns and relationships in the data.*

CEO3: *To build Dashboard applications.*

CEO4: *To communicate the results clearly and concisely*

CEO5: *To be able to work with different formats of data sets.*

Lab Problems:

1. Understanding Data, What is data, where to find data, Foundations for building Data Visualizations, Creating Your First visualization?

2. Getting started with PowerBI Software using Data file formats, connecting your Data to PowerBI, creating basic charts (line, bar charts, Tree maps), Using the Show me panel.

3. PowerBI Calculations, Overview of SUM, AVR, and Aggregate features, Creating custom calculations and fields.

4. Applying new data calculations to your visualizations, Formatting Visualizations, Formatting Tools and Menus, Formatting specific parts of the view.

5. Editing and Formatting Axes, Manipulating Data in PowerBI data, Pivoting PowerBI data.

6. Structuring your data, Sorting and filtering Tableau data, Pivoting Tableau data.

7. Advanced Visualization Tools: Using Filters, Using the Detail panel, using the Size panels, customizing filters, Using and Customizing tooltips, Formatting your data with colors.

8. Creating Dashboards & Storytelling, creating your first dashboard and Story, Design for different displays, adding interactivity to your Dashboard, Distributing & Publishing your Visualization.

9. PowerBI file types, publishing to PowerBI Online, Sharing your visualizations, printing, and Exporting.
10. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

REFERENCE BOOKS:

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition, 2017.
2. R Programming for Data Science by Roger D. Peng (References), 2015.
3. The Art of R Programming by Norman Matloff Cengage Learning India, 2011.

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** knowledge on Data Visualization and Familiarize with PowerBI Software	PO1
CO2	**Analyse**thevarious editing and formatting structures to learn advanced Visualisationtols	PO2
CO3	**Design**the steps by step procedure to create dashboards & storytelling.	PO3
CO4	**Utilize** appropriate tools to create custom charts, cyclical data and circular area charts.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	**Continue enhancing** your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C213: Data Visualization using Power BI	C213.1	3	-	-	-	-	-	-	-
	C213.2	-	3	-	-	-	-	-	-
	C213.3	-	-	3	-	-	-	-	-
	C213.4	-	-	-	3	-	-	-	-
	C213.5	-	-	-	-	3	-	-	-
	C213.6	-	-	-	-	-	-	3	-
	C213.7	-	-	-	-	-	-	-	3
	C213	3	3	3	3	3	-	3	3

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
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I MCA – II SEMESTER			
COURSE CODE:	**24MCAAC1**	**CREDITS:**	**NIL**
COURSE TITLE:	**UNIVERSAL HUMAN VALUES** (Audit Course-1)	**L-T-P:**	**2-0-0**

PREREQUISITES: *No Prerequisite is required.*

COURSE EDUCATIONAL OBJECTIVES:

CEO1: *To help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.*

CEO2 :*To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such holistic perspective forms the basis of Universal Human Values and movement towards valuebased living in a natural way.*

CEO3: *Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.*

CEO4: *To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.*

UNIT I:INTRODUCTION TO VALUE EDUCATION	Lecture Hrs:10

Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)-Understanding Value Education-self-exploration as the Process for Value Education-Continuous Happiness and Prosperity – the Basic Human Aspirations-Exploring Human Consciousness-Happiness and Prosperity – Current Scenario-Method to Fulfill the Basic Human Aspirations.

UNIT II: HARMONY IN THE HUMAN BEING	Lecture Hrs:10

Understanding Human being as the Co-existence of the self and the body. Distinguishing between the Needs of the self and the body-The body as an Instrument of the self-Understanding Harmony in the self-Harmony of the self with the body-Programme to ensure self-regulation and Health.

UNIT III: HARMONY IN THE FAMILY AND SOCIETY	Lecture Hrs:10

Harmony in the Family – the Basic Unit of Human Interaction-'Trust' – the Foundational Value in Relationship- 'Respect' – as the Right Evaluation-Other Feelings, Justice in Human-to-Human Relationship-Understanding Harmony in the Society-Vision for the Universal Human Order.

UNIT IV:HARMONY IN THE NATURE/EXISTENCE	Lecture Hrs:10

Understanding Harmony in the Nature-Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature-Realizing Existence as Co-existence at All Levels- The Holistic Perception of Harmony in Existence.

UNIT V:IMPLICATIONS OF THE HOLISTIC UNDERSTANDING – A LOOK AT PROFESSIONAL ETHICS	Lecture Hrs:10

Natural Acceptance of Human Values-Definitiveness of (Ethical) Human Conduct-A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order-Competence in Professional Ethics-: Holistic Technologies, Production Systems and Management ModelsTypical Case Studies-Strategies for Transition towards Value-based Life and Profession

TEXT BOOKS:

1. *R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1*

2. *R R Gaur, R Asthana, G P Bagaria,Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93- 87034-53-2*

REFERENCE BOOKS

1. *JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.*
2. *Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.*
3. *The Story of Stuff (Book).*
4. *The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi*
5. *Small is Beautiful - E. F Schumacher.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	Define the terms like Natural Acceptance, Happiness and Prosperity	PO1,PO2
CO2	Identify one's self, and one's surroundings (family, society nature). Apply what they have learnt to their own self in different day-to-day settings in real life (L3)	PO1,PO2
CO3	Relate human values with human relationship and human society.	PO1,PO2
CO4	Justify the need for universal human values and harmonious existence.	PO1,PO2
CO5	Develop as socially and ecologically responsible engineers	PO1,PO2

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C214: Universal Human Values	**C214.1**	3	2	-	-	-	-	-	2
	C214.2	3	2	-	-	-	-	-	2
	C214.3	3	2	-	-	-	-	-	2
	C214.4	3	2	-	-	-	-	-	2
	C214.5	3	2	-	-	-	-	-	2
	C214	3	2	-	-	-	-	-	2

II MCA – I SEMESTER			
COURSE CODE:	**24MCA211**	**CREDITS:**	**4**
COURSE TITLE:	**MACHINE LEARNING**	**L-T-P:**	**4-0-0**

*PREREQUISITES: Courses on "**Artificial Intelligence**"& "**Data Mining**"*

COURSE EDUCATIONAL OBJECTIVES:

    CEO1 To introduce students to the basic concepts and techniques of Machine Learning.
    CEO2 To have a thorough understanding of the Supervised and Unsupervised learning techniques
    CEO3 To study the various probability based learning techniques.
    CEO4 To understand graphical models of machine learning algorithms.

UNIT I:INTRODUCTION AND DATA PREPROCESSING:	**Lecture Hrs:10**

Basic concept of Machine Learning- Types of Machine Learning-– Supervised Learning – Unsupervised Learning- Reinforcement learningApplications and challenges-A Brief Review of ProbabilityTheory-Baye's Theorem.

Data Preprocessing- Data Cleaning, Data Integration, Data Transformation, Data Reduction or Dimensionality Reduction - Principal component Analysis.

UNIT II:MODEL EVALUATION AND FEATURE ENGINEERING:	**Lecture Hrs:12**

Selecting a Model, training a Model, Model Representation andInterpretability, Evaluating Performance of a Model, Improving performance of a Model. Basics ofFeature Engineering-Feature Transformation, Feature Subset Selection.

UNIT III: REGRESSION :	**Lecture Hrs:12**

Introduction to Supervised Learning and Regression, Linear Regression, Evaluation of ModelEstimators, Regularization-Ridge regression, LASSO regression, Multi Linear Regression,GradientBased Methods. Cost function- Minimizing the Cost Function for a Single-VariableFunction, Minimizing the Cost Function for a Two-Variable Function, Evaluation Metrics (MeanAbsolute Error (MAE), Mean Squared Error (MSE), Root Mean Squared Error (RMSE), Root MeanSquared Log Error (RMSLE), R Squared (R2), Adjusted R Squared).

UNIT IV: Classification :	**Lecture Hrs:12**

Introduction to Classification, Logistic Regression-Building Logistic Regression Model (LogitFunction), Maximum Likelihood Estimation. Decision Tree-Steps to Construct a Decision Tree,Classification Using Decision Trees, Issues in Decision Trees, Ensemble Learning-Random Forest.Bayesian Classification-Naive Bayes Classifier, k-Nearest Neighbor (KNN). Neuron-Neural Networks-The PerceptronMultilayerPerceptron(MLP), Support Vector Machines- Linear Support Vector Machines, Optimal Hyperplane, RadialBasis Functions, Evaluation Metrics (Accuracy, Confusion Matrix, Precision, Recall, F1 Score).

UNIT V: Clustering	**Lecture Hrs:12**

Introduction to Unsupervised Learning Algorithms, Clustering- Types of Clustering, Partitioning Methods of Clustering, Hierarchical Methods, Density-based Methods and Grid-Based Methods- K-

means Clustering- Choosing number of Clusters.

TEXT BOOKS:

1. Anuradha Srinivasaraghavan and Vincy Joseph, "Machine Learning", Wiley Publisher,2019.
2. SaikatDutt, Subramanian Chandramouli and Amit Kumar Das, "Machine Learning",Pearson,2019.
3. Alpaydin Ethem, "Introduction to Machine Learning", 3rd Edition, PHI learningprivate limited, 2019.

REFERENCE BOOKS:

1. "Machine Learning: A Probabilistic Perspective", 2012, Kevin P. Murphy, MIT Press.
2. "Pattern Recognition and Machine Learning", 2007, Christopher Bishop, Springer.
3. "Introduction to Machine Learning", MIT Press, 3/e, 2014, Ethem Alpaydin.

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	Use knowledge on statistics for machine learning, Understand about Data Preprocessing, Dimensionality reduction	PO1, PO2,PO3
CO2	Apply proper model for the given problem and use feature Engineering Techniques.	PO1, PO2,PO3, PO4, PO8
CO3	Analyze various regression techniques and Neural Networks	PO1, PO2,PO3,P04
CO4	Identify various classification algorithm and their methodologies	PO1, PO2,PO3,P04, PO8
CO5	Understand and apply various clustering algorithms	PO1, PO2,PO3,P04, PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C301: Machine Learning	**C301.1**	3	3	3	-	-	-	-	-
	C301.2	3	2	3	2	-	-	-	2
	C301.3	3	2	2	3	-	-	-	-
	C301.4	3	3	3	3	-	-	-	3
	C301.5	3	3	3	2	-	-	-	3
	C301	3	2.6	2.8	2.5	-			2.4

II MCA – I SEMESTER			
COURSE CODE:	**24MCA212**	**CREDITS:**	**4**
COURSE TITLE:	**SOFTWARE ENGINEERING**	**L-T-P:**	**3-1-0**

PREREQUISITES: *Knowledge on Information Technology may be helpful.*

COURSE EDUCATIONAL OBJECTIVES:

- **CEO1** *To Understand, Analyze and Model User's Requirements.*
- **CEO2** *To select appropriate process model to apply for all Stages of Software Development Life Cycle (SDLC).*
- **CEO3** *To select and apply appropriate Design Methodology.*
- **CEO4** *To decide the feasibility of using and applying Agile Development Process.*
- **CEO5** *Assure Software Quality, select and apply appropriate Testing Strategies.*

UNIT - I : INTRODUCTION	Lecture Hrs:10

The Evolving role of Software - Changing nature of Software - Legacy Software - Software myths. A layered technology- A Process Framework- CMMI- Process assessment - Personal and team Process Models.

UNIT - II : PROCESS MODELS	Lecture Hrs:12

The waterfall model- Incremental process models- Evolutionary process models- Specialized Process Models-Agile process - Agile process Model: Extreme programming.

UNIT - III : SOFTWARE REQUIREMENTS AND SYSTEM MODELS	Lecture Hrs:12

Functional and non-functional requirements- User requirements- System requirements- Interface specification- The software requirements document-Feasibility studies- Requirements elicitation and analysis-Requirements validation- Requirements management. Context Models- Behavioral models- Data models-structured methods.

UNIT - IV: DESIGN ENGINEERING& ARCHITECTURE, TESTING STRATEGIES	Lecture Hrs:12

Design process and Design quality- Design concepts- the design model - Creating an architectural design: software architecture- Data design- Architectural styles and patterns- Architectural Design. A strategic approach to software testing- Test strategies for conventional Software - Validation testing-System testing-The art of debugging.

UNIT - V: TESTING TACTICS, SOFTWARE MEASUREMENT AND ESTIMATION	Lecture Hrs:12

Software testing fundamentals - White-Box testing- Basis path testing- Control structure Testing- Black box testing. Size oriented metrics- Function oriented metrics- Metrics for software quality- Empirical Estimation Models: - Quality Management: Software quality assurance- Formal Technical Reviews.

TEXT BOOKS:

1. *Software Engineering, A practitioner's Approach, 7/e, 2009, Roger S Pressman, Tata McGraw-Hill International Edition .*
2. *Software Engineering, 8/e, 2006, Ian Sommerville, Pearson Education, India.*

REFERENCE BOOKS:

1. *Fundamentals of Software Engineering , 2/e, 2005, Rajib Mall , Prentice Hall Inc, India.*
2. *Software Engineering: A Precise Approach , 1/e, 2010, Pankaj Jalote , Wiley, India.*
3. *Software Engineering: A Primer , 1/e, 2008, Waman S Jawadekar , Tata McGraw Hill , India.*
4. *Software Engineering - Principles and Practices ,1/e, Deepak Jain , Oxford University Press.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** the processes of software development.	PO1
CO2	**Analyze** the customer business requirements and choose the appropriate Process model for the project.	PO1,PO2, PO5,PO8
CO3	**Build** the prototype for Software business case and analyze the requirements of software project.	PO1,PO2,PO5, PO8
CO4	**Design** the System based on Architectural styles and Design patterns. .	PO1,PO2, PO3,PO5, PO8
CO5	**Design** test cases and Define metrics for standardization and assuring quality standards. .	PO1,PO2,PO3, PO3,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C302: Software Engineering	C302.1	3	-	-	-	-	-	-	-
	C302.2	3	3	-	-	3		-	3
	C302.3	3	3	-	-	3	-	-	3
	C302.4	3	3	3	-	3	-	-	3
	C302.5	3	3	3		3	-	-	3
	C302	3	3	3		3			3

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

II MCA – I SEMESTER			
COURSE CODE:	**24MCA213**	**CREDITS:**	**4**
COURSE TITLE:	**BIG DATA ANALYTICS**	**L-T-P:**	**4-0-0**

PREREQUISITES: Courses on "DataBase Management Systems" , "Object Oriented Programming through JAVA" and knowledge on Intelligence Techniques.

COURSE EDUCATIONAL OBJECTIVES:

CEO1	*To explore the fundamental concepts of Big Data.*
CEO2	*To Learn Basic concepts of Hadoop.*
CEO3	*To Write Hadoop MapReduce Programs for analyzing Big data.*
CEO4	*To Explore Hadoop Ecosystem.*

UNIT - I: **UNDERSTANDING BIG DATA**	**Lecture Hrs:10**

What is BigData, Concepts and Terminology - Datasets, Data Analysis, Data Analytics, Big Data Characteristics – volume, velocity, variety, veracity, value, Different Types of Data – Structured Data, Unstructured Data, Semi-Structured Data, Case Study Background.

UNIT - II : **HADOOP BASICS**	**Lecture Hrs:10**

Brief history of hadoop, Apache hadoop and the hadoop ecosystem. A weather dataset, analyzing the data with unix tools, analyzing the data with hadoop , Understanding different Hadoop modes, understanding Hadoop Features-Understanding HDFS, Understanding MapReduce, Learning the HDFS and Mapreduce Architecture-Understanding the HDFS architecture, Understanding the MapReduce Architecture, Understanding the HDFS and MapReduce architecture by plot.

UNIT - III: **WORKING WITH PIG AND HIVE**	**Lecture Hrs:12**

Pig -Execution Types, An Example, Pig Latin-Structure, Statements,Types, Schemas, Functions, Data Processing Operators.Hive – An example, Tables –Managed Tables and External tables, Partitions and Buckets, Importing data, Altering Data, Dropping Tables, Querying Data-Sorting and Aggragating, Mapreduce Scripts.

UNIT - IV : **INTRODUCTION TO APACHE SPARK**	**Lecture Hrs:12**

What is Apache Spark, Characteristics – Speed, Easy of Use, Modularity, Extensibility, Apache Spark Components as a Unified Stack, Spark Basic Data Types, Spark Core and SQL- Dynamic Partition Pruning, SQL Operations, Schemas and Creating Data Frames

UNIT - V: **HBASE, ZOOKEEPER, SQOOP**	**Lecture Hrs:12**

HBase Overview – Limitations of Hadoop, what is HBase,HBase and HDFS,StorageMechansim in HBase,Features of HBase, Applications of HBase. ZooKeeper Overview – what is ZooKeeper, Distributed Application, Benefits of Distributed Applications,Challenges of Distributed Applications, What is Apache Zookeeper meant for, Benefits of ZooKeeper

TEXT BOOKS:

1. *Big Data Fundamentals: Concepts, Drivers & Techniques", 1/e, 2016, Thomas Erl, Wajid Khattak, Paul Buhler, Prentice Hall.*

2. *"Hadoop:The Definitive Guide," 3/e, 2012, Tom White, O'REILLY Publications.*

3. *"Learning Spark"*

REFERENCE BOOKS:

1. *Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics , 2012, Bill Franks, John Wiley & Sons..*
2. *Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data, 2012, Paul C. Zikopoulos, Chris Eaton, Dirk deRoos, Thomas Deutsch, George Lapis, McGraw-Hill.*
3. *Intelligent Data Analysis, 2007, Michael Berthhold, David J.Hand, Springer.*
4. *Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming data, 2011, Paul Zikopoulos, Chris Eaton, Paul Zikopoulos, McGraw hill.*
5. *Big Data for Dummies, 2012, Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman,John Wiley & Sons*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*	POs related to COs
CO1	**Realize** characteristics of Big Data and various types of data like structured, unstructured and semistructured	PO1,PO2
CO2	**Understand** two major components of Hadoop	PO1,PO2,PO3,PO4, PO5
CO3	**Analyze** Big data using Hadoop Map Reduce programs	PO1, PO2,PO4, PO5
CO4	get **Acquainted** with two Data Access Components of Hadoop Ecosystem called pig and hive	PO1,PO3, PO4
CO5	Acquire **Knowledge** on Data Storage Component of Hadoop Ecosystem called Hbase, Data Integration Component of Hadoop Ecosystem like sqoop and Monitoring, Management and Orchestration of Hadoop Ecosystem component like zookeeper	PO1,PO2, PO3,PO4

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C303: Big Data Analytics	**C303.1**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
	C303.2	**3**	**3**	**2**	**3**	**2**	**-**	**-**	**-**
	C303.3	**3**	**3**	**-**	**3**	**3**	**-**	**-**	**-**
	C303.4	**3**	**-**	**3**	**3**	**-**	**-**	**-**	**-**
	C303.5	**3**	**3**	**2**	**3**	**-**	**-**	**-**	**-**
	C303	**3**	**2.75**	**2.3**	**3**	**2.5**	**-**	**-**	**-**

II MCA – I SEMESTER			
COURSE CODE:	**24MCA214A**	**CREDITS:**	**3**
COURSE TITLE:	**NATURAL LANGUAGE PROCESSING** (Professional Elective-III)	**L-T-P:**	**3-0-0**

PREREQUISITES: A Course on "Artificial Intelligence", Machine Learning and Knowledge on basic linear algebra may be helpful.

COURSE EDUCATIONAL OBJECTIVES:

CEO1: To understand the algorithms available for the processing of linguistic information and

computational properties of natural languages.

CEO2: To conceive basic knowledge on various morphological, syntactic and semantic NLP tasks.

CEO3: To familiarize various NLP software libraries and data sets publicly available.

CEO4: To develop systems for various NLP problems with moderate complexity.

CEO5: To learn various strategies for NLP system evaluation and error analysis.

UNIT- I: REGULAR EXPRESSIONS, TEXT NORMALIZATION, EDIT DISTANCE:	Lecture Hrs:10

Regular Expressions- words-Corpora- Text Normalization- Minimum Edit Distance.N-gram Language Models: N-Grams- Evaluating Language Models- Generalizations and Zeros- Smoothing- Kneser-Ney Smoothing – The Web and Stupid Backoff.

UNIT- II: NAIVE BAYES AND SENTIMENT CLASSIFICATION:	Lecture Hrs:12

Naive Bayes Classifiers- Training the Naive Bayes Classifier- Example- Optimizing for Sentiment Analysis – Naive Bayes for other text classification tasks- Naive Bayes as a Language Model- Evaluation : Precision, Recall, F-measure- Test sets and Cross-Validation.Logistic Regression: Classification, The sigmoid- Learning in Logistic Regression – The cross-entropy loss function- Gradient Descent- Regularization- Multinomial logistic regression- Interpreting models- Deriving the Gradient Equation

UNIT- III: NEURAL NETWORKS AND NEURAL LANGUAGE MODELS:	Lecture Hrs:12

Units-The OR Problem-Feed- Forward Neural Networks- Training Neural Networks- Natural Language Models.Vector Semantics and Embeddings: Lexical Semantics- Vector Semantics- words and Vectors- Cosine for measuring similarity- TF-IDF-Weighting terms in the vector-Applications of the TF-IDF vector model- Pointwise Mutual Information- Word2vec- Visualizing Embeddings- Semantic properties of embeddings- Bias and Embeddings- Evaluating Vector Models.

UNIT- IV: PART-OF-SPEECH TAGGING:	Lecture Hrs:12

English Word Classes- The Penn Treebank Part-of- Speech Tagset- Part-of-Speech Tagging- HMM Part-of-Speech Tagging – Maximum Entropy Markov Models Bidirectionality- Part-of-Speech Tagging for Morphological Rich Languages

UNIT- V: SEQUENCE PROCESSING WITH RECURRENT NETWORKS:	Lecture Hrs:12

Simple Recurrent Neural Networks- Applications of Recurrent Neural Networks .Encoder-Decoder Models, Attention and Contextual Embeddings: Encoder-Decoder Networks- Attention- Applications of Encoder-Decoder Networks.

TEXT BOOK:

1. Speech and Language Processing An Introduction to Natural Language Processing, Computational

Linguistics and Speech Recognition, DanielJurafsky, James H. Martin Third Edition, 2019,

REFERENCE BOOKS:

1. Foundations of Statistical Natural Language Processing, Christopher D. Manning, Hinrich Schutze, MIT Press England.

2. Natural Language Processing with Python, Steven Bird, Ewan Klein and Edward Loper, First edition, O'Reilly Publication.

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	Describe the concepts of morphology, syntax, semantics, discourse & pragmatics of natural language.	PO1,PO2,
CO2	Demonstrate understanding of the relationship between NLP and statistics & machine learning.	PO1,PO2,
CO3	Discover various linguistic and statistical features relevant to the basic NLP task such as Semantic and Embedding analysis and other tasks like spelling correction, morphological analysis, parts-of-speech tagging.	PO1, PO2 PO3
CO4	Develop systems for various NLP problems with moderate complexity and solve it with deep neural network models	PO1, PO2, PO3
CO5	Evaluate NLP systems, identify shortcomings and suggest solutions for these shortcomings	PO1, PO2, PO3, PO8.

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C304: Natural Language Processing	C304.1	3	3	-	-	-	-	-	-
	C304.2	3	3	-	-	-	-	-	-
	C304.3	3	2	3	-	-	-	-	-
	C304.4	3	3	2	-	-	-	-	-
	C304.5	3	2	3	-	-	-	-	2
	C304	3	2.6	2.67					2

II MCA – I SEMESTER			
COURSE CODE:	**24MCA214B**	**CREDITS:**	**3**
COURSE TITLE:	**QUANTUM COMPUTING** (Professional Elective-III)	**L-T-P:**	**3-0-0**

PREREQUISITE: *A course on "Artificial Intelligence"*

COURSE EDUCATIONAL OBJECTIVES :

CEO1. *Understand the building blocks of quantum computer.*
CEO2. *Understand the principles, quantum information and limitation of quantum operationsformalizing.*
CEO3. *Gain knowledge about the quantum error and its correction.*

UNIT – I : FOUNDATION	Lecture Hrs:10

Overview of traditional computing – Church-Turing thesis – circuit model of computation – reversible computation – quantum physics – quantum physics and computation – Dirac notation and Hilbert Spaces – dual vectors – operators – the spectral theorem – functions of operators – tensor products – Schmidt decomposition theorem.

UNIT – II : QUBITS AND QUANTUM MODEL OF COMPUTATION	Lecture Hrs:12

State of a quantum system – time evolution of a closed system – composite systems – measurement – mixed states and general quantum operations – quantum circuit model – quantum gates – universal sets of quantum gates – unitary transformations – quantum circuits

UNIT – III: QUANTUM ALGORITHMS	Lecture Hrs:12

Super dense coding – quantum teleportation – applications of teleportation – probabilistic versus quantum algorithms – phase kick-back – the Deutsch algorithm – the Deutsch- Jozsa algorithm – Simon's algorithm – Quantum phase estimation and quantum Fourier Transform – eigen value estimation.

UNIT – IV : QUANTUM ALGORITHMS	Lecture Hrs:12

Order-finding problem – eigen value estimation approach to order finding – Shor's algorithm for order finding – finding discrete logarithms – hidden subgroups – Grover's quantum search algorithm – amplitude amplification – quantum amplitude estimation – quantum counting – searching without knowing the success probability.

UNIT - V : QUANTUM COMPUTATIONAL COMPLEXITY AND ERROR CORRECTION	Lecture Hrs:12

Computational complexity – black-box model – lower bounds for searching – general black-box lower bounds – polynomial method – block sensitivity – adversary methods – classical error correction – classical three-bit code – fault tolerance – quantum error correction – three- and nine-qubit quantum codes – fault-tolerant quantum computation.

TEXT BOOK:

1. *"An introduction to Quantum Computing", 2006, P. Kaye, R. Laflamme, and M. Mosca, Oxford University Press.*

REFERENCE BOOK:

1. *"Quantum Computing" , 2007, V. Sahni, Tata McGraw-Hill Publishing Company.*

COURSE OUTCOMES:	POs related to COs
On successful completion of this course, students will be able to:	
CO1	**Demonstrate** the foundation of Quantum Computing	PO1, PO2
CO2	**Relate** Quantum Models of computation with Quantum mechanics	PO1,PO2,PO3
CO3	**Explore** Quantum Computing algorithms and operations for coding, teleportation and transformation	PO1,PO2, PO3
CO4	**Explore** Quantum Computing algorithms and operations for grouping, counting and searching	PO1,PO2,PO3, PO4
CO5	**Describe** the Quantum Computational complexity and physical realization	PO1,PO2,PO3, PO8

COURSE OUTCOMES:

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C305: Quantum Computing	C305.1	3	2	-	-	-	-	-	-
	C305.2	2	3	3	-	-	-	-	-
	C305.3	3	3	2	-	-	-	-	-
	C305.4	3	2	3	2	-	-	-	-
	C305.5	3	2	3	-	-	-	-	2
	C305	2.8	2.5	2.5	2	-	-	-	2

II MCA – I SEMESTER			
COURSE CODE:	**24MCA214C**	**CREDITS:**	**3**
COURSE TITLE:	**SERVICE ORIENTED ARCHITECTURE** (Professional Elective-III)	**L-T-P:**	**3-0-0**

PREREQUISITES: Courses on "Computer Networks" and "Operating Systems".

COURSE EDUCATIONAL OBJECTIVES:

> *CEO1 To provide fundamental concepts of SOA & Web Service Architecture.*
> *CEO2 To gain knowledge about SOAP, WSDL, UDDI and XML to create web services.*
> *CEO3 To gain knowledge about various protocol, transaction procedure, data exchange in service orientation.*

UNIT - I : INTRODUCTION TO SOA	Lecture Hrs:10

Fundamentals of SOA-Evolution of SOA: A SOA Timeline-Continuing Evolution of SOA. Service Oriented Business & Government-SOA Architecture Concepts-Service Governance, Processes, Guidelines, Principles, Method & Tools-Key Service characteristics-Technical & Business Benefits of SOA

UNIT - II :SOA & WEB SERVICES	Lecture Hrs:10

The Web Service Plafrom-Service Contract-Service Level Data Model-Service discovery-Service Level Integration Process-Atomic & Composite Service-A Retrospective on SOA

UNIT – III: SOA & WEB SERVICE FOR INTEGRATION, SOA & MULTI CHANNEL ACCESS	Lecture Hrs:12

SOA & Web Service for Integration : Overview of Integration-Integration & Interoperability using XML & Web Service-Two approaches for using XML & Web Services for integration & Interoperability-Applying SOA & Web Services for Integration-Enterprise Service Bus Pattern.

SOA & Multi Channel Access: Business Benefits-SOA for Multi Channelaccess-Presentation Tier-Channel Access Tier-Communication Infrastructure-Business Service access Tier-Business Service Tier.

UNIT – IV :SOA & BUSINESS PROCESS MANAGEMENT, METADATA MANAGEMENT	Lecture Hrs:12

SOA & Business Process Management: Basic BPM Concept-Example Business Process-Combining BPM, SOA Web Services-Orchestration & Choreography Specification.

Metadata Management: Approach to Metadata Management-Metadata Specification-Policy-WS Metadata Exchange

UNIT – 5V: ADVANCED MESSAGING & TRANSACTION PROCESSING	Lecture Hrs:12

Advanced Messaging: Reliable Messaging-Notification.   Transaction Processing: Transaction Paradigm-Impact of Web Service for Transaction Protocol & coordination-Transaction Specification

TEXT BOOKS :

1. *Understanding SOA with Web Services, 2009, Eric Newcomer and Greg Lomow, Pearson Education.*
2. *Service Oriented Architecture –Concepts,Technology and Design,2013,Thomas Erl, Pearson Education.*

REFERENCE BOOKS :

1. *Applied SOA-SOA and Design Strategies, 2008, Michael Rosen and others, Wiley Publishers*
2. *SOA Security, 2008, Ramarao Kanneganti and Prasad Chodavarapu, Dream tech Press.*
3. *Developing Java Web Services, 2008, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.*
4. *Developing Enterprise Web Services, 2008, S. Chatterjee, J. Webber, Pearson Education.*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Emphasize** on basic knowledge of service Oriented Architecture pertaining to evolution , principles, concepts and benefits	PO1
CO2	**Relate** Service Oriented Architecture and web services components	PO1,PO2, PO3
CO3	**Analyze** the integration and access method of service oriented architecture and web services.	PO1,PO2, PO3
CO4	**Apply** SOA with various business process specification and Management	PO1,PO2, PO3,PO4
CO5	**Integrate** the various components of messaging and transactions with web services	PO1,PO2, PO3,PO4

COURSE OUTCOMES:

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C306: Service Oriented Architecture	C306.1	3	-	-	-	-	-	-	-
	C306.2	3	2	2	-	-	-	-	-
	C306.3	3	2	2	-	-	-	-	-
	C306.4	3	2	2	3	-	-	-	-
	C306.5	3	2	2	3	-	-	-	-
	C306	3	2	2	3	-	-	-	-

II MCA – I SEMESTER			
COURSE CODE:	**24MCA215A**	**CREDITS:**	**3**
COURSE TITLE:	**DATA SCIENCE** (Professional Elective-IV)	**L-T-P:**	**3-0-0**

PREREQUISITES: A Course on "Artificial Intelligence", Data Mining and Knowledge on basic linear algebra may be helpful.

COURSE EDUCATIONAL OBJECTIVES:

    CEO1: To learn what is data science and skills needed to be a Data Scientist.

    CEO2: To learn about Data Science Process ,Data Exploration and Data Visualization.

    CEO3 : To learn the Machine learning algorithms to solve Classification and Prediction problems.

    CEO4: To learn how to Evaluate the models using different evaluation measures.

    CEO5: To learn how to Design a Recommendation Engine and Feature selection methods.

UNIT-I: INTRODUCTION:	**Lecture Hrs:8**

AI, machine learning and Data Science- what is Data Science-Case for Data Science- Data Science classification- Data Science Algorithms.

UNIT-II: DATA SCIENCE PROCESS:	**Lecture Hrs:12**

Prior knowledge- Data Preparation- Modeling – Application- Knowledge

Data Exploration: Objectives of Data Exploration- Data sets- Descriptive Statistics- Data Visualization.

UNIT-III: CLASSIFICATION:	**Lecture Hrs:12**

Decision trees- Rule Induction- K-Nearest neighbours- Naive Bayesian- Artificial Neural networks- Support vector Machines.

Regression methods : Linear Regression- Logistic Regression

UNIT-IV: MODEL EVALUATION :	**Lecture Hrs:12**

Confusio

n Matrix- ROC and AUC – Lift curves.

Recommendation Engines : Why do we need Recommendation engine- Applications of Recommendation engines - Recommendation Engine Concepts - collaborative filtering- Content based Filtering- Hybrid Recommenders,

UNIT-V: FEATURE SELECTION	**Lecture Hrs:10**

Classifying Feature selection methods- Principal Component Analysis- Information theory based filtering – Chi Square based filtering - Wrapper type Feature selection

TEXT BOOK:

1. Data Science Concepts and Practice by Vijay Kotu, Bala Deshpande , second edition, 2018, Morgan Kaufman publications.

REFERENCE BOOKS:

1. Doing Data Science Straight talk from the Frontline, 2014, Rachel Schutt & Cathy O'Reilly.

2. Foundations of Data Science- Avrin Blum, John Hopcroft and Ravindran Kannan, 2018.

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Able** to describe what is data science and the skill sets needed to be a data scientist.	PO1,PO2,PO3,PO4
CO2	**Able** to describe about Data Science process, Data preparation , Data Exploration and Data Visualization. the basic terms used in statistical inference and **Identifying** the right probability distributor used for statistical modeling	PO1,PO2,PO3,PO4
CO3	To **analyze** the complex engineering problem and **apply** the machine learning algorithms such as Classification and Regression models to solve the problems..	PO1,PO2,PO3,PO4
CO4	To **evaluate** the models using confusion matrix, ROC curves. To **build** a recommendation engine and study about its applications.	PO1,PO2,PO3,PO4, PO8
CO5	To **Understand** the feature selection methods **used** in Data science.	PO1,PO2,PO3,PO4, PO8

COURSE OUTCOMES:

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C307: Data Science	**C307.1**	**3**	**3**	**1**	**1**	-	-	-	-
	C307.2	**2**	**3**	**2**	**3**	-	-	-	-
	C307.3	**3**	**2**	**3**	**2**	-	-	-	-
	C307.4	**2**	**3**	**3**	**3**	-	-	-	**2**
	C307.5	**3**	**3**	**3**	**3**	-	-	-	**2**
	C307	**2.6**	**2.8**	**2.4**	**2.4**				**2**

II MCA – I SEMESTER			
COURSE CODE:	**24MCA215B**	**CREDITS:**	**3**
COURSE TITLE:	**BLOCK CHAIN TECHNOLOGY** (Professional Elective-IV)	**L-T-P:**	**3-0-0**

PREREQUISITE: Courses on "Data base Management Systems" and "Data Warehousing and Data mining"

COURSE EDUCATIONAL OBJECTIVES:
CEO1   *To provide fundamental concepts of Block Chain Mechanisms.*
CEO2   *To gain knowledge about different Architecture of various Block Chains.*
CEO3   *To gain knowledge about the Applications of Block Chain.*

UNIT - I :BLOCK CHAIN	Lecture Hrs:10

Distributed System-History of Block Chain-Introduction to Block chain-Types of Block Chain-CAP Theorem-Benefits & Limitations of Block Chain.

UNIT – II:DECENTRALIZATION	Lecture Hrs:10

Decentralization using Block Chain-Method of Block Chain-Toutes to Block Chain-Block Chain & Full Eco System-Decentralized Applications-Platform for Decentralization.

UNIT - III:BITCOIN& ALTERNATIVE COIN	Lecture Hrs:12

Bitcoin-Transaction-Block Chain-Bitcoin Payment-Bitcoin Limitation-Namecoin-Litecoin-Primcoin-Zcash.

UNIT - IV :ETHEREUM 101	Lecture Hrs:10

Introduction-Ethereum Block Chain-Elements of Ethereum Block Chain-Accounts0 Types of AccountsEther-Messages-Mining-Clients & Wallets-Ethereum Network.

UNIT - V :BLOCK CHAIN OUTSIDE OF CURRENCIES, SCALABILITY & OTHER CHALLENGES	Lecture Hrs:12

Block Chain outside of Currencies: Internet of Things-Government-Health-Finance-Medical.**Scalability& Other Challenges**: Scalability-Privacy-Security.

TEXT BOOK :

1. *Mastering Block Chain, 2017, Imran Bashir, Packt publishing Limited.*

REFERENCE BOOKS :

1. *Mastering the Bitcoin-Programming the Open Block Chain, 2017, Andreas M Antonopoulos,O'Reilly Publication.*
2. *Block Chain-Blue Print for a New Economy, 2015,Melanie Swan, O'Reilly Publication.*
3. *Block Chain Revolution, 2016, Don Tapscott, Portfolio Penguin Publications.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Understand** the preliminary history and principles of block chain architecture components and techniques	PO1
CO2	**Relate** the platform for decentralization with block chain technology	PO1,PO2,PO3
CO3	**Apply** Bit-coin system by using block chain technology	PO1,PO2, PO3,PO4
CO4	**Design** hyper ledger applications using block chain technology	PO1,PO2,PO3, PO4
CO5	**Relate** general applications by using block chain technology and other challenges	PO1,PO2,PO3, PO4

COURSE OUTCOMES:

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C308: Block Chain Technology	**C308.1**	3	-	-	-	-	-	-	-
	C308.2	3	2	2	-	-	-	-	-
	C308.3	3	2	2	3	-	-	-	-
	C308.4	3	2	2	3	-	-	-	-
	C308.5	3	2	2	3	-	-	-	-
	C308	3	2	2	3	-	-	-	-

II MCA – I SEMESTER			
COURSE CODE:	**24MCA215C**	**CREDITS:**	**3**
COURSE TITLE:	**INTERNET OF THINGS** (Professional Elective-IV)	**L-T-P:**	**3-0-0**

PREREQUISITES: Courses on "Computer Networks " and "Artificial Intelligence".

COURSE EDUCATIONAL OBJECTIVES:

CEO1	*To understand the basics of Internet of Things.*
CEO2	*To get an idea of some of the application areas where Internet of Things can be applied.*
CEO3	*To understand the middleware for Internet of Things.*
CEO4	*To understand the concepts of Web of Things.*
CEO5	*To understand the IOT protocols.*

UNIT -I: INTRODUCTION TO INTERNET OF THINGS	Lecture Hrs:12

Introduction, Definition and characteristics of IoT - Physical Design of IoT-Things in IoT, IoT protocols-Logical design of IoT- IoT Functional blocks, IoT Communication Models, IoT Communication APIs- IoT Enabling Technologies- Wireless Sensor Networks, Cloud Computing, Big Data Analytics, Communication protocols, Embedded Systems-IoT Levels and Deployment Templates-Iot Level-1,IoT Level-2, IoT Level-3, IoT Level-4, IoT Level-5, IoT Level-6. **Domain Specific IoT.**

UNIT – II: IOT AND M2M	Lecture Hrs:10

Introduction-M2M-Difference between IoT and M2M-SDN and NFV for IoT-Software Defined Networking, Network Function Virtualization-IoT system Management with NETCONF-YANG.

Need for IoT Systems Management- Simple Network Management Protocol(SNMP)-Limitations of SNMP-Network Operator Requirements-NETCONF-YANG-IoT Systems Management with NETCONF-YANG-Netopeer.

UNIT – II :DEVELOPING INTERNET OF THINGS	Lecture Hrs:12

IoT platforms Design Methodology: Introduction-IoT design Methodology-Step 1:Purpose and Requirements specification, Step 2:Process specification, step 3:Domain model Specification, step 4:Information Model Specification ,step 5:Service Specifications, step 6:IoT Level Specification, Step 7:Functional view specification, step 8:Operational view specification, step 9:Device and Component Integration, Step 10:Application Development-Case study on IoT system for weather Monitoring-Motivation for using Python-IoT systems-Logical Design using Python-Introduction- Installing Python-Python data Types & Data Structures- Numbers, Strings, Lists, Tuples, Dictionaries, Type Conversions- Python Packages of interest for IoT- JSON, XML, HTTP Lib & URL Lib ,SMTP Lib.

UNIT - IV: INTEGRATEDBILLING SOLUTIONS IN THE INTERNET OF THINGS	Lecture Hrs:12

Cost of RFID and the Internet of Things, Benefits of RFID and the Internet of things, Cost Benefit sharing, A technical framework for Integrating Billing Capabilities into the EPC global Network-Business Models for the Internet of Things-Business Models and Business Model Innovation-Value creation in the Internet of Things-Exemplary Business Model Scenarios for the Internet of Things.

UNIT – V:WEB OF THINGS	Lecture Hrs:10

From the internet of things to the web of things-Designing RESTful smart things-Modeling Functionality as Linked Resources-Future of Web of things-Real time web of things, Finding and Describing Smart Things, Sharing Smart Things-Discussing the future Web of things-Conclusion- Semantic Web-Semantic web

services, Semantic web services processes and Lifecycle-Ontology-Ontology Engineering Methodologies, Application of Ontology Engineering in the Internet of Things, Ontology and the Organizational Perspective, Ontology and the I-T system Perspective, Ontology and the Data Perspective.

TEXT BOOKS :

1.*Internet of Things, A hands-ON approach, Arshdeep Bahga, Vijay Madisetti.*
2.*Architecting the Internet of Things, Dieter Uckelmann,Mark Harrison, Florian Michahelles.*

REFERENCE BOOKS:

1. *Networks, Crowds, and Markets: Reasoning About a Highly Connected World, 2010, David Easley and Jon Kleinberg, Cambridge University Press.*
2. *The Internet of Things: Applications to the Smart Grid and Building Automation, 2012, Olivier Hersent, Omar Elloumi and David Boswarthick – Wiley.*
3. *The Internet of Things – Key applications and Protocols, 2012, Olivier Hersent, David Boswarthick, Omar Elloumi, Wiley.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	**Demonstrate** the basic introduction about IoT technologies, Domain specific application	PO1
CO2	**Summarize** about IoT with machine to machine and system management	PO1,PO2, PO3
CO3	**Outline** IoT specification, implementation and protocols	PO1,PO2, PO3,PO5
CO4	**Apply** IoT in billing solution	PO1,PO2, PO3,PO4
CO5	**Relate** web of things with IoT and apply IoT in semantic web and ontology.	PO1,PO2, PO3,PO4, PO5

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C309: Internet of Things	C309.1	3	2	2	2	-	-	-	-
	C309.2	2	3	2	3	-	-	-	-
	C309.3	2	2	3	-	-	-	-	-
	C309.4	3	2	2	2	-	-	2	2
	C309.5	2	2	-	-	-	-	2	2
	C309	2.4	2.2	2.22	2.33	-	-	2	2

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

II MCA – I SEMESTER			
COURSE CODE:	**24MCA216**	**CREDITS:**	**2**
COURSE TITLE:	**MACHINE LEARNING LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: A course on "Machine Learning"

Course Educational Objectives

CEO1   To understand the knowledge about basic python libraries To Realize storage of Big Data into HDFS.

CEO2   To Make use of Data sets in implementing the machine learning algorithms.

CEO3   To analyze the supervised Learning algorithms.

CEO4   To identy and analyze the unsupervised learning algorithms.

CEO5   To use different tools and techniques for implementing machine learning algorithms

Appropriate datasets from the following repository can be utilized:

1. https://www.kaggle.com/datasets
2. http://sci2s.ugr.es/keel/datasets.php#sub1

List of Experiments:

1. Demonstrate how do you structure data in Machine Learning.

2. Implement Data Preprocessing techniques on real time dataset.

4. Implement Feature subset selection techniques.

5. Implement and demonstrate Simple Linear Regression. Use the appropriate data set.

6. Implementation of Multiple Linear Regression for House Price Prediction using sklearn.

7. Demonstration of Regularization-LASSO, Ridge regression using appropriate data set.

8. Implementation of Logistic Regression using sklearn.

9. Write a program to demonstrate the working of the decision tree algorithm. Use anappropriate data set for building the decision tree and apply this knowledge to classify anew sample.

10. Write a program to implement the naïve Bayesian classifier for a sample training data setstored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

11. Implement SVM with different kernel methods.

12. Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions.

13. Write a program to demonstrate the working of K-Means Clustering.

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	Understand the structuring data in Machine Learning	PO1
CO2	Analyze the use of data sets in implementing ML algorithms	PO2
CO3	Implement the supervised learning algorithms in different applications.	PO3
CO4	Identify and implement appropriate unsupervised learning algorithm for solving complex problems.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO6
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C310: Machine Learning Lab	C310.1	3	-	-	-	-	-	-	-
	C310.2	-	3	-	-	-	-	-	-
	C310.3	-	-	3	-	-	-	-	-
	C310.4	-	-	-	3	-	-	-	-
	C310.5	-	-	-	-	3	-	-	-
	C310.6	-	-	-	-	-	-	3	-
	C310.7	-	-	-	-	-	-	-	3
	C310	3	3	3	3	3	-	3	3

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA   DEPARTMENT

	II MCA – I SEMESTER		
COURSE CODE:	**24MCA217**	**CREDITS:**	**2**
COURSE TITLE:	**BIG DATA ANALYTICS LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: A course on "Big data Analytics"

Course Educational Objectives

CEO1   To Understand Setting up of Hadoop Cluster.
CEO2   To Realize storage of Big Data into HDFS.
CEO3   To implement Map Reduce programs for processing big data.
CEO4   To Explore PigLatin script.
CEO5   To Explore Hive commands.

List of Experiments

1)   Procedure to install   and set Hadoop in the following 3 modes

   a) Standalone mode

   b) Pseudo mode

   c) Fully distributed mode

2)   Perform HDFS basic Command-line file operations.

3)   Implement Word Count Program using MapReduce.

4)   Implement an MR Program that processes weather Dataset.

5)   Implement an MR Program to analyse Patient Dataset.

6)   Implement Basic Spark Exercises

7)   Install, Run Pig and Illustrate PigLatin scripts to load, store and dump data .

8)   Illustrate Pig Latin scripts to sort, group, join, project, and filter your data.

9)   Install and Run Hive then use Hive to create, alter, and drop databases, tables, views, functions, and indexes.

REFERENCE BOOKS

1. "Hadoop:The Definitive Guide**,"** 3/e, 2012, Tom White, O'REILLY Publications.

2. "Big Data for Dummies", 2012, Hurwitz, Alan Nugent, Dr. Fern Halper, Marcia Kaufman, John Wiley & Sons.

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Acquire** fundamental Knowledge of storing Big Data in HDFS, file operation commands, Basic Pig Script commands	PO1
CO2	**Analyze** Weather and Patient Data sets Using Hadoop Components	PO2
CO3	**Develop** Big Data Applications using Pig Script .	PO3
CO4	**Use** Appropriate tools and Techniques for **solving** Real World Big Data Problems	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C311: Big Data Analytics Lab	C311.1	3	-	-	-	-	-	-	-
	C311.2	-	3	-	-	-	-	-	-
	C311.3	-	-	3	-	-	-	-	-
	C311.4	-	-	-	3	-	-	-	-
	C311.5	-	-	-	-	3	-	-	-
	C311.6	-	-	-	-	-	-	3	-
	C311.7	-	-	-	-	-	-	-	3
	C311	3	3	3	3	3	-	3	3

II MCA – I SEMESTER			
COURSE CODE:	**24MCA218**	**CREDITS:**	**2**
COURSE TITLE:	**DevOPs&AGILE PROGRAMMING LAB**	**L-T-P:**	**0-1-2**

PREREQUISITES: *Courses on "Operating Systems" and "Software Engineering".*

COURSE EDUCATIONAL OBJECTIVES:

CEO1: To understand the concept of DevOps with associated echnologies and methodologies.
CEO2: To be familiarized with Jenkins, which is used to build & test software Applications &Continuous integration in Devops environment. To understand different Version Control tools like GIT, CVS or Mercurial
CEO3: To understand Docker to build, ship and run containerized images
CEO4:To use Docker to deploy and manage Software applications running on Container.
CEO5: To be familiarized with concept of Software Configuration Management & Provisioning using tools like Puppet, Chef, Ansible or Saltstack.

DevOps Laboratory Programs:

1. Build & Test Applications with Continuous Integration- To Install and Configure Jenkins to test, and deploy Java or Web Applications using NetBeans or eclipse.
2. Version Control- To Perform Version Control on websites/ Software's using different Version control tools like RCS/ CVS/ GIT/ Mercurial (Anytwo)
3. Virtualization & Containerization- To Install and Configure Docker for creating Containers of different Operating System Images Virtualization & Containerization- To Build, deploy and manage web or Java application on Docker
4. Software Configuration Management - To   install andconfigure Software Configuration Management using Chef/ Puppet/ Ansibleor Salt stack. Provisioning-To Perform Software Configuration Management and provisioning using Chef/ Puppet/ Ansibleor Salt stack.

AgileLaboratoryPrograms:

1. Understand the background and driving forces for taking an Agile Approach to Software Development.
2. Understand the business value of adopting agile approach.
3. Understand agile development practices
4. Drive Development with Unit Test using Test Driven development.
5. Apply Design principle and Refactoring to achieve agility
6. To study automated build tool.
7. To study version control tool.
8. To study Continuous Integration tool.
9. PerformTesting activities with in anagile project.

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Understand** the core concepts and practices of DevOps	PO1
CO2	**Perform** Version Control on websites/ Software's and software configuration Mangement. **Manage** Multi container applications.	PO2
CO3	**Demonstrate** a comprehensive understanding of Agile principles and methodologies.	PO3
CO4	**Utilize** appropriate tools to execute the programs, and thoroughly understand the advantages and limitations of each tool.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO6
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C312: DevOps & Agile Programming Lab	C312.1	3	-	-	-	-	-	-	-
	C312.2	-	3	-	-	-	-	-	-
	C312.3	-	-	3	-	-	-	-	-
	C312.4	-	-	-	3	-	-	-	-
	C312.5	-	-	-	-	3	-	-	-
	C312.6	-	-	-	-	-	-	3	-
	C312.7	-	-	-	-	-	-	-	3
	C312	3	3	3	3	3	-	3	3

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)

MCA DEPARTMENT

II MCA – I SEMESTER			
COURSE CODE:	**24MCA219**	**CREDITS:**	**2**
COURSE TITLE:	**PROMPT ENGINEERING** **(Skill Enhancement Course- III)**	**L-T-P:**	**0-1-2**

PREREQUISITES: Knowledgr on "Chat-GPT" may be helpfull

COURSE EDUCATIONAL OBJECTIVES:

> *CEO1: To understand the fundamental concepts of prompt engineering.*
>
> *CEO2: To develop skills in creating effective prompts for various NLP tasks.*
>
> *CEO3: To evaluate and optimize prompts for better performance.*
>
> *CEO4: To apply prompt engineering techniques in real-world applications.*

Module 1:

Prompt Engineering- Introduction-What is Prompt, Types of Prompts, How does Prompt Engineering works, Evaluating and Validating Prompts.Benefits of Prompt Engineering.

Module2:

1. Prompt Engineering- ACTLIKE Prompt
2. Prompt Engineering- FIND Prompt
3. Prompt Engineering- TRANSLATE Prompt
4. Prompt Engineering- CALCULATE Prompt
5. Prompt Engineering- GENERATING IDEAS Prompt
6. Prompt Engineering- RECOMMEND SOLUTIONS Prompt
7. Prompt Engineering- OUTLINE STEPS Prompt
8. Prompt Engineering- CREATIVE SURVEY Prompt
9. Prompt Engineering- DEVELOP SALES STRATEGY Prompt
10. Prompt Engineering- DESIGN FEEDBACK PROCESS Prompt
11. Prompt Engineering- CREATE PROJECT PLAN Prompt
12. Prompt Engineering- ANALYSE CUSTOMER BEHAVIOUR Prompt
13. Prompt Engineering- CREATE CONTENT STRATEGY Prompt

Module 3:

1. Prompt Engineering- PROMPT FOR PROGRAMMERS
2. Prompt Engineering- MARKETTING BASED PROMPTS
3. Prompt Engineering- CUSTOMER CARE BASED PROMPTS
4. Prompt Engineering- CHAIN OF THOUGHT PROMPTS
5. Prompt Engineering- PERSPECTIVE PROMPTS

REFERENCE BOOK
1.Prompt Engineering by tutorialspoint

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	Design and implement effective prompts for various NLP tasks.	PO1
CO2	Analyze and optimize the performance of prompts	PO2
CO3	Use prompt engineering to solve practical problems in different domains.	PO3
CO4	**Utilize** appropriate tools to execute the programs, and thoroughly understand the advantages and limitations of each tool.	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO6
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C313: Propt Engineering	C313.1	3	-	-	-	-	-	-	-
	C313.2	-	3	-	-	-	-	-	-
	C313.3	-	-	3	-	-	-	-	-
	C313.4	-	-	-	3	-	-	-	-
	C313.5	-	-	-	-	3	-	-	-
	C313.6	-	-	-	-	-	-	3	-
	C313.7	-	-	-	-	-	-	-	3
	C313	3	3	3	3	3	-	3	3

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES (AUTONOMOUS)
MCA DEPARTMENT

II MCA – I SEMESTER			
COURSE CODE:	**24MCAAC2**	**CREDITS:**	**NIL**
COURSE TITLE:	**DESIGN THINKING FOR INNOVATION** (Audit Course- 2)	**L-T-P:**	**2-0-0**

PREREQUISITES: *No Prerequisite is necessary*

COURSE EDUCATIONAL OBJECTIVES:

CEO1: To familiarize students with design thinking process as a tool for breakthrough innovation
CEO2: It aims to equip students with design thinking skills and ignite the minds to create innovative ideas
CEO3: To develop solutions for real-time problems

UNIT I: INTRODUCTION TO DESIGN THINKING	Lecture Hrs:10

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT II: DESIGN THINKING PROCESS	Lecture Hrs:10

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT III: INNOVATION ART OF INNOVATION	Lecture Hrs:10

, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity. Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT IV: PRODUCT DESIGN PROBLEM FORMATION	Lecture Hrs:10

introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies Activity: Importance of modelling, how to set specifications, Explaining their own product design.

UNIT V: DESIGN THINKING IN BUSINESS PROCESSES	Lecture Hrs:10

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs- Design thinking for Startups- Defining and testing Business Models and Business CasesDeveloping& testing prototypes

TEXTBOOKS:

1. Tim Brown,Change by design, Harper Bollins (2009)
2.Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

REFERENCE BOOKS:

1. David Lee, Design Thinking in the Classroom, Ulysses press
2. Shrutin N Shetty, Design the Future, Norton Press
3. William Lidwell,Universal Principles of Design- Kritinaholden, Jill Butter.
4. Chesbrough.H, The Era of Open Innovation – 2013

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*	POs related to COs
CO1 **Define** the concepts related to design thinking.	PO1
CO2 **Explain** the fundamentals of Design Thinking and innovation	PO1,PO2
CO3 **Apply** the design thinking techniques for solving problems in various sectors.	PO1, PO2
CO4 **Analyse** to work in a multidisciplinary environment	PO1, PO2
CO5 **Evaluate** the value of creativity ,**Formulate** specific problem statements of real time issues	PO1,PO2, PO3

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C314: Design Thinking and Innovation	**C314.1**	**3**	-	-	-	-	-	-	-
	C314.2	3	**3**	-	-	-	-	-	-
	C314.3	3	3	**-**	-	-	-	-	-
	C314.4	3	3	-	**-**	-	-	-	-
	C314.5	3	3	3	-	**-**	-	-	-
	C314	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**

II MCA – II SEMESTER			
COURSE CODE:	**24MCA221**	**CREDITS:**	**4**
COURSE TITLE:	**DEEP LEARNING**	**L-T-P:**	**4-0-0**

PREREQUISITES: *A Course on "Machine learning", Artificial Neural Networks and Knowledge on basic linear algebra may be helpful.*

COURSE EDUCATIONAL OBJECTIVES:
   CEO 1: ToacquireknowledgeaboutdifferentmathematicaltoolsforDeepLearning.
   CEO 2: Tounderstandfundamentalsofartificialneural networks.
   CEO 3: ToExplore various optimizers and Regularization Techniques
   CEO 4: ToLearn about ConvolutionalNeural Networks.
   CEO 5:Tocomprehend Object Detection, Autoencoder and GAN Architectures

UNIT-I: MATHEMATICAL TOOLS FOR DEEP LEARNING	**Lecture Hrs:12**

Linear Algebra :Matrix, Vector,Transpose,Tensor, operations on elements, Systems of Linear equations,Rank, Norm,expressing a Matrix, Determinant, Trace, Eigen values and Eigen Vectors, Singular Value Decomposition(SVD). **Statistics** – Probability, Random Variable, Binomial Distribution, Poisson Distribution, Normal Distribution, Sampling, Central limit Theorem. **Calculus**- Derivatives, rules forderivatives,Partial derivatives.

UNIT-II: FUNDAMENTALSOFARTIFICIALNEURALNETWORK(ANN)	**Lecture Hrs:12**

Understanding the Biological Neuron, Exploring the Artificial Neuron, Early Implementation of ANN – RmcCulloch-Pits mosel of Neuron, Rosenblatt's Perceptron,Types of Activation Functions-linear function, non-linear function, softmax function. Architectures of neural network- Single layer feed forward network, Multi-layer feed forward ANN, Recurrent Neural Network, Convolutional Networks. Learning Process in ANN – Weight of Interconnection between neurons, Gradient Descent and Backpropagation.

UNIT-III: TRAININGDEEPNEURALNETWORK	**Lecture Hrs:12**

Initializing Weights- He/ Kaiming initialization, Xavier initialization. Batch, Mini-batch and stochastic gradient descent. Regularization-L1/ L2 regularization, Early stopping, Dropout regularization, data augmentation. Normalization of inputs-Batch Normalization, Batch Normas regularizer.

UNIT-IV: CONVOLUTIONAL NETWORKS	**Lecture Hrs:10**

Building blocks of CNN, Building a Convolution Neural Network, Popular CNN Architectures-LeNet-5, AlexNet, ZFNET, VGG-16, GoogleNet and ResNet Object Detection- one stage deection techniques – YOLO, SSD,Two stage object detection techniques – R-CNN, fast R-CNN, faster R-CNN, Mask R-CNN, Applications of Object Detection

UNIT-V: SEQUENCE-BASEDMODELS ANDOTHERDLARCHITECTURES	**Lecture Hrs:12**

Recurrent Neural Network – Data Preparation for RNN Vanishing Gradient problem and RNN, Applications of RNN, Types of RNN, Limitations of RNN, Longshort-termmemory (LSTM), Gated RNNs, Bidirectional RNNs. Other DL Architectures- Autoencoder, Architecture and its applications, GAN, GAN Architecture and its applications,

TEXTBOOKS:

   1. AmitKumarDas,SaptarsiGoswami,PabitraMitra,AmlanChakrabarti,"DeepLearning", Pearson Paperback,First Edition,2021.

2. *IanGoodfellow,YoshuaBengio,AaronCourville, "DeepLearning",MITPress,2016.*

REFERENCE BOOKS:

1. *JoshPattersonandAdamGibson,"Deeplearning:Apractitioner'sapproach",O'ReillyMedia,First Edition,2017.*
2. *NikhilBuduma,   "Fundamentals   of   Deep   Learning,   Designing   next-generationmachineintelligence algorithms",O'Reilly,ShroffPublishers,2019.*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	Understand the mathematical background required for Deep learning.	**PO1,PO2**
CO2	Analyze the fundamental concepts of Artificial neural networks.	**PO1,PO2,PO3**
CO3	Understand and apply the deep neural networks	**PO1,PO2,PO3,PO4**
CO4	Explore the Purpose of Convolution Neural Network, Popular Architectures of CNN	**PO1,PO2,PO3,PO4,PO8**
CO5	To learn about sequence-based models like RNN, LSTM and Gated RNN and other DL architectures and use for real-world problems	**PO1,PO2,PO3,PO4,PO8**

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs** **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C401: Deep Learning	**C401.1**	3	3	-	-	-	-	-	-
	C401.2	3	3	2	-	-	-	-	-
	C401.3	3	3	2	3	-	-	-	-
	C401.4	3	3	3	2	-	-	-	3
	C401.5	3	3	3	3	-	-	-	3
	C401	3	3	2.5	2.67				3

II MCA – II SEMESTER			
COURSE CODE:	**24OMBA41**	**CREDITS:**	**4**
COURSE TITLE:	**ENTERPRENEURSHIP** **(Open Elective-1)**	**L-T-P:**	**4-0-0**

PREREQUISITES: No Prerequisite is required

COURCE EDUCATIONAL OBJECTIVES:

    CEO1: To make students understand the basic perspectives of entrepreneurship

    CEO2: To inculcate knowledge of analyzing process of establishing new business.

    CEO3: To provide knowledge on support systems for entrepreneurship

    CEO4: To give an overview on marketing techniques to enhance new business
    CEO5: To provide knowledge of strategic aspects in managing the new ventures

UNIT – I: ENTREPRENEURIAL PERSPECTIVES:	Lecture Hrs:10

Introduction to Entrepreneurship – Evolution - Concept of Entrepreneurship - Types of Entrepreneurs - Entrepreneurial Competencies, Capacity Building for Entrepreneurs. Entrepreneurial Training Methods - Entrepreneurial Motivations - Models for Entrepreneurial Development - The process of Entrepreneurial Development.

UNIT – II: NEW VENTURE CREATION:	Lecture Hrs:10

Introduction, Mobility of Entrepreneurs, Models for Opportunity Evaluation; Business plans – Purpose, Contents, Presenting Business Plan, Procedure for setting up Enterprises, Central level - Startup and State level - T Hub, Other Institutions initiatives)

UNIT – III: MANAGEMENT OF MSMES AND SICK ENTERPRISES:	Lecture Hrs:12

Challenges of MSME s, Preventing Sickness in Enterprises – Specific Management Problems; Industrial Sickness; Industrial Sickness in India – Symptoms, process and Rehabilitation of Sick Units

UNIT – IV: MANAGING MARKETING AND GROWTH OF ENTERPRISES:	Lecture Hrs:12

Essential Marketing Mix of Services, Key Success Factors in Service Marketing, Cost and Pricing, Branding, New Techniques in Marketing, International Trade.

UNIT – V: STRATEGIC PERSPECTIVES IN ENTREPRENEURSHIP:	Lecture Hrs:12

Strategic Growth in Entrepreneurship, The Valuation Challenge in Entrepreneurship,The Final Harvest of New Ventures, Technology, Business Incubation, India way – Entrepreneurship; Women Entrepreneurs – Strategies to develop Women Entrepreneurs, Institutions supporting Women Entrepreneurship in India.

TEXT BOOKS:

    1.Entrepreneurship Development and Small Business Enterprises, Poornima M.Charantimath, 2nd edition, Pearson, 2014.

    2. Entrepreneurship, a South – Asian Perspective, D.F.Kuratko and T.V.Rao, 3rd edition, Cengage, 2012. 3. Entrepreneurship, Arya Kumar, 4th edition, Pearson 2015

REFERENCE BOOKS:

1. *Entrepreneurship Management- text and cases, 1/e, Bholanath Dutta, Excel Books, New Delhi, 2010*
2. *FundamentalsofEntrepreneurship,2/e,H.Nandan,PHIPublications, NewDelhi, 2011.*
3. *Entrepreneurship,2/e,RajeevRoy,OxfordUniversityPress,NewDelhi, 2011.*
4. *Entrepreneurship,6/e,RobertDHirsrich,MichaelPPeters,DeanAShepherd, TMH, New Delhi, 2010.*
5. *Entrepreneurship Development, 1/e, Abha Mathur, Taxmann Publications, 2021.*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	Demonstrate the basic knowledge of Entrepreneurship and entrepreneurship development	**PO3,PO5,PO6**
CO2	Apply the knowledge to develop business plan for new venture.	**PO2,PO3,PO5,PO6**
CO3	Outline the issues and challenges faced by the MSMEs and rehabilitation of sick units	**PO3,PO5,PO6**
CO4	Identify the marketing practices required for success and growth of new ventures.	**PO2,PO3,PO5,PO6**
CO5	Analyze the strategic perspectives of Entrepreneurship,	**PO3,PO5,PO6,PO7**

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C402: Enterpreneurship	**C402.1**	-	-	3	-	3	2	-	-
	C402.2	-	3	3	-	3	3	-	-
	C402.3	-	-	3	-	3	3	-	-
	C402.4	-	3	3	-	3	3	-	-
	C402.5	-	-	3	-	3	3	2	-
	C402	**-**	**3**	**3**	**-**	**3**	**2.8**	**2**	**-**

I MCA – I SEMESTER

COURSE CODE:	**24OMBA42**	CREDITS:	**4**
COURSE TITLE:	**MANAGEMENT AND ORGANISATIONAL BEHAVIOUR** **(Open Elective-2)**	**L-T-P:**	**4-0-0**

PREREQUISITES: No Prerequisite is required

COURCE EDUCATIONAL OBJECTIVES:

CEO1: *To make students to understand the basic perspectives of management concepts, theories and practices*

CEO2: *To gain and apply the basic knowledge for understanding functional areas of management*

CEO3: *To provide the students with the conceptual framework and theories of organizational behavior*

CEO4: *To make students to understand the concepts of leadership and motivation*

CEO5: *To analyze the group dynamics and conflicting situation in business organizations*

UNIT – I: INTRODUCTION TO MANAGEMENT	Lecture Hrs:8

Introduction, Planning, Process of planning - Techniques of Decision making. Organizing: Organization Structure, Span of Control, Line and Staff, Delegation, Centralization and Decentralization, Staffing, Direction, Controlling and its Techniques, Co-ordination.

UNIT – II: FUNCTIONS OF MANAGEMENT	Lecture Hrs:12

Introduction, Planning, Process of planning - Techniques of Decision making. Organizing: Organization Structure, Span of Control, Line and Staff, Delegation, Centralization and Decentralization, Staffing, Direction, Controlling and its Techniques, Co-ordination

UNIT – III: ORGANIZATIONAL BEHAVIOUR	Lecture Hrs:12

Meaning, Nature and Scope of Organizational Behavior – Perception: Factors Influencing Perception, Learning: Principles of Learning, Theories: Classical conditioning, Operant conditioning and Social Learning Theory. Personality: Determinants and Theories of Personality–Trait Theory, Sigmund Freud Theory, Erickson Theory.

UNIT – IV: LEADERSHIP AND MOTIVATION	Lecture Hrs:12

Leadership, Trait Approach to Leadership, Leadership Styles -Managerial Grid - Transactional Vs Transformational leadership, Motivation: Theories of Maslow, Herzberg, Theory X, Theory Y & Theory Z.

UNIT – V: BEHAVIORAL DYNAMICS	Lecture Hrs:12

Group Dynamics, Transactional Analysis and Johari Window, Management of Organizational Conflicts, Organisational Change and Development, Theories of Planned Change, Impact of Change, Factors affecting Change.

TEXT BOOKS:

1. Essentials of Management, 10/e., 2008, Koontz, H and,Weihrich, H, McGraw-Hill, New York.

2. Organizational Behavior, 15/e, 2013, Stephen P. Robbins, Pearson Education, San Diego

REFERENCE BOOKS:
1. *Organizational Behaviour, 12 /e, 2010, Fred Luthans, Tata McGrawHill, NewDelhi.*
2. *Organizational Behaviour, 15/e, 2012, Robbins, SP, Prentice Hall of India, New Delhi.*
3. *Management and OrganisationalBehaviour, 4/e, 2010, Subbarao P, Himalaya Publishing House, New Delhi.*

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	Understand the nature and concept of Organizational behaviour	PO1,PO2, PO3,PO8
CO2	Apply theories of motivation to analyse the performance problems	PO1,PO2,PO8
CO3	Analyse the different theories of leadership	PO1,PO2, PO3,PO8
CO4	Evaluate group dynamics	PO1,PO2, PO3,PO8
CO5	Analyse organizational dynamics and readiness	PO1,PO2, PO3,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C403: Management and Organizational Behaviour	C403.1	3	3	2	-	-	-	-	2
	C403.2	3	2	2	-	-	-	-	2
	C403.3	3	3	2	-	-	-	-	2
	C403.4	3	3	2	-	-	-	-	2
	C403.5	3	3	2	-	-	-	-	2
	C403	3	2.8	2					2

I MCA – I SEMESTER

COURSE CODE:	24OMBA43	CREDITS:	4
COURSE TITLE:	**RESEARCH METHODOLOGY& IPR** (Open Elective-3)	**L-T-P:**	**4-0-0**

PREREQUISITES: No Prerequisite is required

COURSE EDUCATIONAL OBJECTIVES (CEO):

CEO1: To provide knowledge on various types of research problems
CEO2: To acquire knowledge on plagiarism and research ethics
CEO3: To provide the fundamental knowledge on writing technical paper / presentation without violating professional ethics.
CEO4: To introduce the fundamental aspects of intellectual property Rights to students who are going to play a major role indevelopment of innovative projects in industries / societies.
CEO5: To disseminate knowledge on copyrights and its related rights and registration aspects

UNIT – I: RESEARCH PROBLEM FORMULATION	**Lecture Hrs:9**

Meaning of research problem – Sources of research problem – Criteria characteristics of a good research problem – Errors in selecting a research problem – Scope and objectives of research problem – Approaches of investigation of solutions for research problem, data collection, analysis, interpretation and necessary instrumentations.

UNIT – II: LITERATURE REVIEW	**Lecture Hrs:9**

Effective literature studies approaches and analysis–Plagiarism information, software and analysis–Research ethics.

UNIT – III: TECHNICAL WRITING / PRESENTATION	**Lecture Hrs:9**

Effective technical writing – How to write the project report – How to write the technical paper/ magazine –Developing a research proposal – Format of research proposal – A presentation and assessment by a review committee.

UNIT – IV: INTELLECTUAL PROPERTY RIGHTS (IPR)	**Lecture Hrs:9**

Nature of Intellectual Property: Patents – Designs – Trade and Copyright. **Process of Patenting and Development:** Technological research, Innovation, patenting, development–Procedure for grants of patents, Patenting under PCT. **International Scenario:** International co-operation on intellectual property. **Patent Rights:** Scope of patent rights – Licensing and transfer of technology – Patent information and databases – Geographical indications. **New Developments in IPR:** Administration of patent system – IPR of biological systems, computer software, electronic system, mechanical and automotive system etc., Traditional knowledge case studies on IPR and IITs.

UNIT – V: INTRODUCTION TO COPY RIGHTS	**Lecture Hrs:9**

Introduction to Copyrights: Principles of copyright – Technical/ subject matters of copyright – Rights afforded by copyright law – Copyright ownership – Transfer and duration – Right to prepare derivative works–Rights of distribution–Rights of performers–Copyright formalities and registration– Limitations– Infringement of copyright –Internationalc opyright law– Protection Act.

TEXT BOOKS:

1. *Research Methodology: A Step by Step Guide for Beginners, RanjitKumar, 2/e, 2005, Pearson Education.*
2. *Resisting Intellectual Property, DeboraJ. Halbert, 2006, Taylor & FrancisLtd, 2007.*

REFERENCE BOOKS:

3. *Research Methodology: An Introduction for Science & Engineering Students, Stuart Melville and Wayne Goddard, 2/e, 1996, Juta and Co Ltd.,*
4. *Research Methodology: Methods and Techniques, C.R.Kothariand GauravGarg, 4/e, 2019, New Age International Publishers, NewDelhi.*
5. *Intellectual Property in the New Technological Age, 2016: Vol.I Perspectives, Trade Secrets and Patents, Peter S. Menell, Mark A. Lemley, and Robert P. Merges. 2016.*
6. *Intellectual Property Rights Law in India, T.Ramappa, 2/e, 2016, Asia Law House.*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	Understandandanalyzevarioustypes ofResearchProblems	**PO1, PO2**
CO2	DemonstrateknowledgeonPlagiarismandResearchethics	**PO1,PO2, PO7**
CO3	UnderstandandanalyzethebasicsofResearchProposals	**PO1,PO2, PO7**
CO4	DemonstrateknowledgeonpatentandPCT	**PO1,PO2, PO7**
CO5	Demonstrateknowledgeoncopyrightsfortheirinnovativeworks	**PO1,PO2, PO7**

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C404: Research Methodology	**C404.1**	3	2	-	-	-	-	-	-
	C404.2	3	2	-	-	-	-	2	-
	C404.3	3	2	-	-	-	-	2	-
	C404.4	3	2	-	-	-	-	3	-
	C404.5	3	2	-	-	-	-	3	-
	C404	3	2	-	-	-	-	2.5	-

II MCA – I SEMESTER			
COURSE CODE:	**24OHSM41**	**CREDITS:**	**4**
COURSE TITLE:	**OPTIMIZATION TECHNIQUES** **(Open Elective-4)**	**L-T-P:**	**4-0-0**

PREREQUISITES: Under Graduate level Mathematics

COURSE EDUCATIONAL OBJECTIVES:

CEO1: To create awareness, about optimization in utilization of resources

CEO2: To develop mathematical skills to **Formulate** and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics

CEO3: To develop mathematical skills to **Solve** the problem of transporting the products from origins to destinations with least transportation cost and solving assignment problems

CEO4:To learn the resources required for a project and generate a plan and work schedule

CEO5: To apply Operations research techniques like Replacement problem and PERT/CPM in Research and Industrial operations

UNIT – I: BASICS OF OPERATION RESEARCH AND LINEAR PROGRAMMING	Lecture Hrs:10

Definition of O.R, necessity of operations research, scope of O.R, Phases of O.R, Models in O.R. Introduction, mathematical formulation of LPP, Graphical Solution of LPP , Simplex Method, Artificial variable techniques, Degeneracy and cycling.Duality theorems and its applications, Dual Simplex Method.

UNIT – II: TRANSPORTATION PROBLEM AND ASSIGNMENT MODELS	Lecture Hrs:12

Introduction, Mathematical Formulation, Methods for Finding Initial basic feasible solutions ,Optimum Solution of a Transportation Problems, Degeneracy in Transportation Problems, Unbalanced Transportation Problems, Maximization in Transportation Problems.Introduction and formulation , Hungarian Assignment Algorithm, Variations of the Assignment Problem and Travelling Salesman Problem.

UNIT – III: GAME THEORY AND SEQUENCING MODELS	Lecture Hrs:12

Introduction and some basic terminologies, two – person zero – sum game, Solution methods of games without saddle point.Introduction and basic assumption, Processing n jobs through two machines, processing of n jobs three machines and m machines, Processing two jobs on n machines.

UNIT – IV: REPLACEMENT MODELS, INVENTORY MODELS AND EOQ MODELS	Lecture Hrs:12

Introduction, Replacement of items that deteriorate with time, Group Replacement Policy. Introduction, Cost involved in inventory problems. Purchasing problem with and without shortages, Production problem with and Without shortages

UNIT – 5: SCHEDULING BY PERT AND CPM	Lecture Hrs:12

Introduction, Network Constructions, Rules of network constructions , Fulkerson's Role of numbering events ,

Critical Path Method (CPM),and PERT procedure with problems, Resource analysis in network scheduling.

TEXT BOOKS

1. *Operations Research, 2005 A.M. Natarajan, P. Balasubramani, A. Tamilarasi, Pearson Education, New Delhi.*
2. **Operations Research, 2009, P Sankara Iyer , Tata McGraw-hill, New Delhi.**

REFERENCE BOOKS

1. *Operations Research , 2007, S.D Sharma , Kedar Nath Ram Nath & Co, Meerut.*
2. *Operations Research , 2/e, 2007, R. Panneeselvam , Pentice Hall of India (PHI), New Delhi.*
3. *Operation Research – Theory & Applications, 4/e, 2009, J.K. Sharma, Macmillan India Ltd, New Delhi.*
4. *Operation Research, 13/e, 2007, Kanti Swarup, P.K.Gupta, Man Mohan, Sultan Chand & Sons, New Delhi.*
5. *Operation Research, 8/e, 2007, Hadmy A, Taha, Pearson Education, New Delhi..*

COURSE OUTCOMES: On successful completion of this course, students will be able to:		POs related to COs
CO1	Understand the meaning of Operations Research and how to use it, how to write linear program in the event of minimum cost or maximum profit and to solve complex computational problems using Linear Programming Problem(LPP)	PO1,PO2, PO3,PO8
CO2	Understand Transportation Problem, Assignment Problem and Analyze and design the data, to synthesize transformation by using operational models like Transportation Problem, Assignment Problem	PO1,PO2, PO3,PO8
CO3	Understand Game theory and Sequencing models, Analyze and design the data, to synthesize transformation by using operational models like Game theory and sequencing models	PO1,PO2, PO3,PO8
CO4	Understand Replacement Models, Inventory Models and EOQ Models in the fields of business, research and industry, Analyze and design the data , to synthesize transformation by using operational models like Replacement Models, Inventory Models and EOQ Models	PO1,PO2, PO3,PO8
CO5	Understand Inventory models PERT/CPM etc., in the fields of business research and industry, Analyze and design the data, to synthesize transformation by using operational models like PERT/CPM	PO1,PO2, PO3,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)									
Course	**POs** **COs**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**
C405: Optimization Techniques	**C405.1**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**3**
	C405.2	**3**	**2**	**3**	**-**	**-**	**-**	**-**	**2**
	C405.3	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**3**
	C405.4	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**3**
	C405.5	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**3**

	C405	3	2.8	2.2	-	-	-	-	2.8

II MCA – II SEMESTER

COURSE CODE:	24OHSM42		CREDITS:	4
COURSE TITLE:	NANO SCIENCE AND TECHNOLOGY (Open Electives-5)		L-T-P:	4-0-0

PREREQUISITES: No prerequisite is required

COURSE EDUCATIONAL OBJECTIVES:

CEO1: *To Understand the basic scientific concepts of Nanoscience, and various types of Nano materials.*
CEO2: *To study various methods of synthesising Nanomaterials*
CEO3: *To identify different characterisation techniques for Nanomaterials*
CEO4: *To Understand the properties of Nanomaterials and the applications of Nano materials in various fields*
CEO5: *To study various carbon Nanomaterials.*

UNIT-I: INTRODUCTION TO NANO SCIENCE AND TECHNOLOGY	Lecture Hrs:10

Definition of nano scale,-Significance of nano scale–Surface to volume ratio-Quantum confinement effect-Types of Nano materials: Zero, one and two dimensional nano materials with examples.

UNIT-II: PREPARATION OF NANOMATERIALS	Lecture Hrs:12

Top-Down and Bottom-Up approaches- Methods of preparation: Sol-gel method - Chemical vapour deposition- Plasma arching - Ball milling - Electro-chemical deposition.

UNIT-III: STRUCTURE AND SURFACE CHARACTERIZATION OF NANO MATERIALS	Lecture Hrs:12

X-Ray diffraction - Ultraviolet–Visible Spectroscopy – Fourier Transform Infrared Spectroscopy –Scanning Electron Microscopy – Transmission electron microscopy – Scanning Tunneling Microscope -Atomic force microscopy.

UNIT-IV: PROPERTIES AND APPLICATIONS OF NANO MATERIALS	Lecture Hrs:12

Physical Properties - Chemical Properties - Mechanical properties - Electrical properties - Thermal properties - Magnetic properties - Optical Properties - Applications in Material science, Biology and Medicine, Surface science, Energy, Environment, Industry, Sports& Consumer products.

UNIT-V : CARBON NANOTUBES	Lecture Hrs:12

Allotropes of carbon - Graphene- Fullerences - Types of Carbon Nanotubes -Single walled carbon nanotubes-Multiwalled carbon nanotubes- Fabrication of carbon nanotubes using Plasma Arching Method- Properties and Applications of Carbon nanotubes.

TEXT BOOKS:

1. M.R. Srinivasan, New Age International, "Engineering Physics", Chennai 2011

2. K. Thyagarajan, "Engineering Physics", Mc Graw Hill Publishers, First Edition, New Delhi, 2014.

3. Er. Rakesh Rathi, S. Chand, "Nanotechnology-Technology Revolution" of 21st Century Publications

REFERENCE BOOKS:

1. Nanotechnology- A Gentle Introduction to the Next Big Idea. Kindersely, India. Pvt., New Delhi, 2003,Dorling

2. Nano- The Essentials Understanding Nano Science and Nanotechnology), Tata McGraw - Hill Publication 2010,

COURSE OUTCOMES:		POs related to COs
On successful completion of this course, students will be able to:		
CO1	Acquire the basic knowledge on Nanoscience, and various types of Nano materials.	PO1, PO8
CO2	Identify appropriate method for the preparation of Nano materials	PO1,PO8
CO3	Develops skill to characterize Nanomaterials by various techniques	PO1,PO4,PO8
CO4	Analyze the different properties of Nanomaterials and identify their applications in various fields	PO1,PO8
CO5	Develop Knowledge on carbon Nano materials	PO1,PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs / COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C406: Nano Science and Technology	**C406.1**	3	-	-	-	-	-	-	1
	C406.2	3	-	-	-	-	-	-	1
	C406.3	3	-	-	2	-	-	-	1
	C406.4	3	-	-	-	-	-	-	1
	C406.5	3	-	-	-	-	-	-	1
	C406	3	-	-	2	-	-	-	1

II MCA – II SEMESTER			
COURSE CODE:	**24MCA223**	**CREDITS:**	**10**
COURSE TITLE:	**PROJECT WORK**	**L-T-P:**	**0-0-0**

PREREQUISITES: Students must have Programming skills, Software Engineering skills and Mathematical & Logical skills. Knowledge on Advanced techniques and Algorithms and Minor Project may be helpful.

COURSE EDUCATIONAL OBJECTIVES:

CEO1. To develop the ability to solve a specific problem, right from its identification and literature review till the successful solution of the same.

CEO2. The main objective of the Project Work is for the students to learn and experience all the major phases and processes involved in solving real life engineering applications.

The aim of the project work is to deepen comprehension of principles by applying them to a new problem which may be the design/ fabrication/ analysis for a specific application, a research project with a focus on an application needed by the industry/ society, a computer project, a management project, or a design and analysis project. A project topic must be selected by the students in consultation with their guides. To train the students in preparing project reports and to face reviews and viva- voce examination.

Out of a total of 100 marks for the project work,40 marks shall be for internal evaluation and 60 marks for the external examination (viva-voce). The internal evaluation shall be done by the committee, consisting of HOD/HOD's nominee, co-coordinator and project supervisor on the basis of two seminars to be given by each student on the topic of his /her project. The viva-voce shall be conducted by a committee consisting of HOD/HOD's nominee, co-coordinator, project supervisor and an external examiner. The evaluation of project work shall be conducted at the end of the II- II semester

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Demonstrate** in-depth knowledge on the project topic Selection.	PO1
CO2	**Identify, analyze** and **formulate** complex problem chosen for project work to attain substantiated conclusions.	PO2
CO3	**Design** solutions to the chosen project problem. Undertake **investigation** of project problem to provide valid conclusions.	PO3
CO4	**Use** the appropriate techniques, resources and modern engineering tools necessary for project work.	PO4
CO5	**Function** effectively as individual and a member in the project team.	PO5
CO6	**Demonstrate** knowledge and understanding of cost and time analysis required for carrying out the project.	PO6
CO7	**Understand** professional and ethical responsibilities while executing the project work.	PO7
CO8	**Engage** in lifelong learning to **improve** knowledge and competence in the chosen area of the project.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs \ COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C407: Project Work	**C407.1**	**3**	-	-	-	-	-	-	-
	C407.2	-	**3**	-	-	-	-	-	-
	C407.3	-	-	**3**	-	-	-	-	-
	C407.4	-	-	-	**3**	-	-	-	-
	C407.5	-	-	-	-	**3**	-	-	-
	C407.6	-	-	-	-	-	3	-	**-**
	C407.7	-	-	-	-	-	-	3	-
	C407.8	-	-	-	-	-	-	-	3
	C407	3	3	3	3	3	3	3	3

I MCA – I SEMESTER			
COURSE CODE:	24MCA224	**CREDITS:**	2
COURSE TITLE:	DEEP LEARNING USING PYHTON LAB (Skill Enhancement Course- IV)	**L-T-P:**	0-1-2

PREREQUISITES: Courses on" Deep Learning"

COURSE EDUCATIONAL OBJECTIVES
   CEO1: The fundamental principles of e-Business and e- Commerce and the role of Management,
   CEO2: The underlying used technologies with emphasis on Internet Technologies
   CEO3:The application of tools and services to the development of small scale e-Commerce applications.

Syllabus:

1) Perform all Matrix Operations using NumPy Library

2) Illustrate Bionomial, Piosson and normal distribution using scipy.stats Library

3) Implement a simple feedforward neural network using a library like TensorFlow or keras

4) Implement various optimiziers like SGD, Batch Gradient Descent, Mini Batch Gradient Descent

5) Implement a Multi Layer Neural network Using Libraries like Kers or Tensorflow

6) Image Classification on MNIST Dataset

7) Illustrate AlexNet, VGGNET,GOOGLENET

8) Apply RNN for Autocompletion

9) Apply RNN for Language Translation

10) Apply LSTMfor Autocompletion

11) Train a sentimental analysis model on IMDB Dataset

12) Apply the Autoencoder for Denoising an image

13) Apply the Autoencoder for Dimensionality Reduction

14) Traina GAN for converting Text to Image Generation

15) Train a GAN for Data Augmentaion

COURSE OUTCOMES: *On successful completion of this course, students will be able to:*		POs related to COs
CO1	**Demonstrate** knowledge on basic Mathematics required for Deep Learning	PO1,
CO2	**Analyse** the given problem and Identify suitable Neural Network required to solve the problem	PO2
CO3	**Design**the steps by step procedure to solve any real world problem through corresponding Neural Network	PO3
CO4	**Utilize** appropriate tools like keras or tensflow, colabetc.. to train and test the neural network	PO4
CO5	Do **experiment**s effectively as an individual and as a member in a group	PO5
CO6	**Follow** ethical principles in Analyzing, designing and implementing various Programming concepts.	PO7
CO7	Continue enhancing your programming skills to effectively implement various applications throughout your career.	PO8

CO-PO MAPPING(DETAILED; HIGH:3; MEDIUM:2; LOW:1)

Course	POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
C408: Deep Learning usin Python Lab	C408.1	3	-	-	-	-	-	-	-
	C408.2	-	3	-	-	-	-	-	-
	C408.3	-	-	3	-	-	-	-	-
	C408.4	-	-	-	3	-	-	-	-
	C408.5	-	-	-	-	3	-	-	-
	C408.6	-	-	-	-	-	-	3	-
	C408.7	-	-	-	-	-	-	-	3
	C408	3	3	3	3	3	-	3	3

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