<u>**MCA DEPARTMENT**</u>

ACADEMIC REGULATIONS-2016
COURSE STRUCTURE
AND
DETAILED 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.**

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.**

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PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

Graduates of Computer Applications shall

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)

PO1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

MCA DEPARTMENT

ACADEMIC REGULATIONS FOR MCA

(Effective for the students admitted into the Academic Year 2016-17)

1. ELIGIBILITY FOR ADMISSION:

- Admission to the above programme shall be made subject to the eligibility qualifications as prescribed by the university from time to time.
- Admission shall be made strictly on the basis of merit rank obtained by the qualifying candidates at an entrance test (ICET) to be conducted by the university or on the basis of any other order of merit approved by the university, subject to reservations prescribed by the Government of Andhra Pradesh.

2. AWARD OF DEGREE:

- A candidate shall be eligible for the award of respective degree if he/ she satisfies the minimum academic requirements in every subject including the seminar comprehensive viva-voce and project work successfully in not less than prescribed course work duration and not more than double the prescribed course work duration with he/she has not involved in any sort of indisciplinary activities certified by the principal.
- Students, who fail to fulfill all the above academic requirements, shall forfeit their seat in MCA course and their admission will stand cancelled.

3.COURSE PATTERN:

The entire course work for MCA is of six semesters. In I-I, I-II, II-I, II-II, III-I semesters the student has to study the course work and during III-II semester the student should carry out project work.

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Table 1: Contact periods/ credits and marks

	Semester				
	Periods/ week	Credits	Internal marks	External marks	Total Marks
Theory	04	04	40	60	100
Practical	03	02	40	60	100
Seminar	--	02	100	-	100
Comprehensive viva- voce	--	02	100	-	100
Project Work	--	12	40	60	100

Table 2: Course pattern and total credits

Semester	No.of subjects	Number of labs	Total credits	
I-I	05	03	5x4+3x2=26	26
I-II	05	03	5x4+3x2=26	26
II-I	05	03	5x4+3x2=26	26
II-II	05	03	5x4+3x2=26	26
III-I	05	03	5x4+3x2 =26	26
III-II	Comprehensive viva-voce		2	2
III-II	Seminar and Project Work		2 + 12	14
Total Credits				146

4. ATTENDANCE:

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

- **Shortage of attendance below 65% in aggregate shall in <u>NO</u> case be condoned.**

- Condonation of shortage of attendance in aggregate up to 10% (65% or above but below 75%) in each semester may be granted on valid reasons only.

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

- A student will not be promoted to the next semester unless he/ she satisfies the attendance requirements of the present semester and can seek re-admission for that semester when offered next.

- A stipulated condonation fee shall be payable to the college towards the shortage of attendance.

5. DISTRIBUTION AND CREDENCE OF MARKS

a. EVALUATION OF STUDENT'S PERFORMANCE:

- The performance of a student in each semester shall be evaluated subject-wise with a maximum of 100 marks for each Theory and Practical subject. In addition, a seminar for 100 marks and project work for 100 marks shall be evaluated.

- For theory subjects the distribution of marks shall be 40 for internal evaluation and 60 marks for the external examination. There shall be five units in each of the theory subjects

b. INTERNAL EXAMINATIONS:

- During the semester, there shall be t<u>wo</u> internal examinations for theory subjects.

- Each internal examination consists of 5 short answer questions for 10 marks and descriptive paper consists of 5 questions, out of which student has to answer 3 questions for 30 marks within 2 hours duration. Each internal examination will be conducted for 40 marks .

- I - internal examination shall be conducted in units-I,II and half of III unit and II-mid- term examination shall be conducted in the remaining syllabus.

- 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.

- 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 and 20% to the other.

c. EXTERNAL EXAMINATION:

- The External Examination question paper consists of short answer questions (without choice) for 10 marks and 5 descriptive answer questions of equal credence with internal choice for 50 marks for a total duration of 3 hours.

- All questions have to be answered compulsory. Each question may consists one, two or more sub questions

- 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.

d. SEMINAR AND COMPREHENSIVE VIVA-VOCE:

- For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding about the topic and submit the same to the department before making presentation. The report and the presentation shall be evaluated by the three member committee.

- The Seminar and comprehensive viva-voce shall be evaluated by a three member committee consisting of HOD/HOD's nominee, Co-ordinator and one senior faculty member.

- Comprehensive viva-voce pertaining to the student's specialization will be conducted for 100 marks (internal evaluation) at the end of III-II semester by the above three member committee.
  He/ she should to secure 50% marks to acquire the required credits.

e. PROJECT WORK EVALUATION:

- 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 III- II semester.

6. MINIMUM ACADEMIC REQUIREMENTS:

Academic requirements to be satisfied besides the attendance mentioned in section-**5 :**

a. A student shall be deemed to have satisfied the minimum academic requirements and acquired the credits allotted to each theory, practical, seminar, comprehensive viva-voce and project, if he/ she secures a minimum of 40% of marks in the external examination and a total of 50% of marks in the internal and external examinations put together for that particular subject.

b. For practical subjects, 60 marks shall be for the End Semester Examinations and 40 marks will be for internal evaluation based on the day to day performance.

c. For Seminar there will be an internal evaluation of 100 marks. A candidate has to secure a minimum of 50% to be declared successful. The assessment will be made by a board consisting of HOD/HOD nominee and two senior internal experts at the end of the semester instruction.

7. RE-REGISTRATION FOR IMPROVEMENT OF INTERNAL MARKS:

Conditions to avail the benefit of improvement of internal evaluation marks

- The candidate should have completed the course work and obtained examination results for I-I and I-II- semesters.

- He should have passed all the subjects in which the internal marks secured are 50% or above.

- Out of the subjects the candidate has failed in the examination due to lack of internal marks secured being less than 50%, the candidate shall be given one chance for each theory subject and for a maximum of three theory subjects for improvement of internal marks.

- The candidate has to re-register for the chosen subjects and fulfill the academic requirements as and when they are offered.

- For each subject the candidate has to pay a fee equivalent to one third of the semester tuition fee and the amount is to be remitted in the form of DD in favour of the Principal, SITAMS payable at Chittoor along with a requisition through the HOD/ HOD's nominee of the respective department.

- In case of availing the chance of improvement of internal marks, both the internal marks as well as the external marks secured in the previous attempts for the registered subjects will stand cancelled.

8. EVALUATION OF PROJECT WORK / DISSERTATION:

- Every candidate shall be required to submit thesis/ dissertation after taking up a topic approved by the Project Review Committee (PRC).

- A PRC shall be constituted with Principal as the Chairperson, HOD and two senior faculty members.

- A candidate is permitted to register for the project work after satisfying the attendance requirement of all the subjects (theory and practical).

- 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.

- 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 the case may be.

- A candidate shall submit status report in two stages at least with a gap of 3 months.

- The work on the project shall be initiated at the beginning of III-II-semester and the duration of the project is for a semester. For the approval of PRC, the candidate shall

submit the draft copy of thesis to the Principal (through HOD) and shall make an oral presentation before the PRC.

- Three copies of the project thesis certified by the supervisor shall be submitted to the institute.

- The HOD/ HOD's nominee will submit a panel of 5 examiners to the Principal through the Controller of the Examinations, who are eminent and expertise in that field with the help of the guide and HOD concerned. The thesis shall be adjudicated by any one external examiner selected from the panel that is submitted by the Controller of Examinations in consultation with the Principal.

- If the report of the examiner is not favorable, the candidate shall have to revise and resubmit the thesis, in the time frame as stipulated by PRC. If the report of the examiner is unfavorable again, the thesis shall be summarily rejected.

- If the report of the examiner is favorable, viva-voce examination shall be conducted by a board consisting of the supervisor, HOD and the examiner who adjudicated the Project work. The Board shall jointly report the candidate's performance. The HOD shall coordinate and make arrangements for the conduct of viva-voce examination.

- If the candidate fails in viva-voce, then he/ she has to reappear for the viva-voce examination after 45 days. If he/ she fails again in the second viva-voce examination, he/ she will not be eligible for the award of the degree.

9. RE-ADMISSION:

When a student is detained due to lack of credits/ shortage of attendance he/ she has to get re-admitted for that semester/ year after fulfillment of academic regulations, whereas he/ she continues to be in the academic regulations in which he/ she is admitted.

10. TRANSITORY REGULATIONS:

Candidates who have been detained due to lack of attendance or have not fulfilled academic requirements or failed after having undergone the course in the earlier regulations or 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, subject to section-**2** and they continue to be in the same academic regulations in which they are admitted.

11. WITHHOLD OF RESULTS:

If the candidate has not paid the dues to the college or if any case of indiscipline/ malpractice is pending against him/her, the result of such candidate shall be withheld and he/she will not be allowed/ promoted into the next higher semester. The issue of degree is liable to be withheld in such cases.

12. AWARD OF LETTER GRADES:

- All assessments of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) secured by the candidate in each subject as detailed below:

Letter grade	Grade points	Marks range
S	10	90 – 100
A	9	80 – 89
B	8	70 – 79
C	7	60 – 69
D	6	50 – 59
F	0	< 50 (Fail)
AB	0	---------

- **Grade sheet:**

After results are declared, grade sheets will be issued to the student with the following details:

a. The college in which the candidate has studied

b. The list of courses enrolled during the semester and the grade scored

c. The Grade Point Average (GPA) for the semester and

d. The Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester/ I-year onwards

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- **i SGPA**

  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 = Σ (Ci × Gi)/ Σ C$_i$

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

- **ii CGPA**

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

  CGPA = Σ (Ci × Si)/ Σ C$_i$

  Where „Si" is the SGPA of the ith semester and C$_i$ is the total number of credits in that semester.

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

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

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

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

13. CLASSIFICATION OF SUCCESSFUL CANDIDATES.

- 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.

Classification	CGPA
First class with distinction	>=7.5 and above
First Class	>=6.5 to <7.5
Second Class	>=5.0 to <6.5

- A minimum of 5.0 CGPA is required for the award of the degree.

14. REVALUATION AND IMPROVEMENT

- A candidate can apply for revaluation of his/ her external examination answer paper in a theory course, within two days from the date of declaration of results, on payment of a prescribed fee through proper application to the Controller of Examinations through the Head of the Institution. A candidate can apply for revaluation of answer scripts in not more than **5**subjects at a time. The Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Principal.

- No revaluation for seminar, comprehensive viva-voce, practical and project work.

- A candidate can be allowed to apply for improvement only in theory subjects in the next supplementary examinations of that semester (not more than one chance per subject).

15. NUMBER OF INSTRUCTION DAYS:

The minimum no. of instruction days including examinations will be 90 per semester.

16. RULES OF DISCIPLINE:

- Any attempt by any student to influence the teachers, examiners, faculty and staff of controller of examination for undue favors in the exams, and bribing them for marks/

attendance will be treated as malpractice cases and the student will be debarred from the college.

- When the student absents himself/ herself, he/ she is treated as to have appeared and obtained ZERO marks in that subject(s) and grading is done accordingly.

- When the performance of the student in any subject(s) is cancelled as a punishment for indiscipline, he/she will be awarded zero marks in that subject(s).

- When the student's answer book is confiscated for any kind of attempted or suspected malpractice the decision of the examiner is final.

17. GENERAL:

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

- Malpractices rules- nature and punishments is appended.

- In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Vice-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.

18. DISCIPLINARY ACTION FOR MALPRACTICES/ IMPROPER CONDUCT IN EXAMINATIONS

	Nature of Malpractices/ Improper conduct	Punishment
	If the candidate	
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	Expulsion from the examination hall and cancellation of the performance in that subject only.

	an aid in the subject of the examination)	
(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.
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 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 to appear for the remaining 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 practicals 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 candidate is subject to the

		academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he/she will be handed over to the police and a case is registered against him/her.
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.	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 candidate is 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	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

	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 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.	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.
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 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 the external examinations. The continuation of the course 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 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.
11.	copying is detected on the basis of internal	Cancellation of the performance in that

	evidence, such as, during valuation or during special scrutiny.	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.	

Malpractices identified by Invigilators or special invigilators or additional or controller of examinations or Principal

Punishments to the candidates as per the above guidelines.

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)

MCA DEPARTMENT

MCA COURSE STRUCTURE (Regular) (2016 – 17)

I MCA- I Semester

S. No.	Course Code	Subject	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16MCA111	Discrete Structures and Automata Theory	3	1	-	4	40	60	100
2	16SAH117	Technical English	4	-	-	4	40	60	100
3	16MCA112	Management for Computer Professionals	4	-	-	4	40	60	100
4	16MCA113	Programming in C	3	1	-	4	40	60	100
5	16MCA114	Computer Organization	3	1	-	4	40	60	100
6	16MCA115	Programming in C Lab	-	-	3	2	40	60	100
7	16MCA116	Information Technology Lab	-	-	3	2	40	60	100
8	16SAH118	English Communication Skills Lab	-	-	3	2	40	60	100
Contact periods per week			**17**	**3**	**9**				
Total periods per week				**29**					
	Total credits(5 Theory+3 Labs)					**26**			
	Total marks						**320**	**480**	**800**

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I MCA- II Semester

S. No.	Course Code	Subject	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16SAH123	Probability and Statistics	3	1	-	4	40	60	100
2	16MBA128	Accounting & Financial Management	3	1	-	4	40	60	100
3	16MCA121	Object Oriented Programming Through JAVA	3	1	-	4	40	60	100
4	16MCA122	Operating Systems	3	1	-	4	40	60	100
5	16MCA123	Data Structures	3	1	-	4	40	60	100
6	16MCA124	Object Oriented Programming Through JAVA Lab	-	-	3	2	40	60	100
7	16MCA125	Operating Systems Lab	-	-	3	2	40	60	100
8	16MCA126	Data Structures Lab	-	-	3	2	40	60	100
Contact periods per week			**15**	**5**	**9**				
Total periods per week			**29**						
Total credits(5 Theory+3 Labs)						**26**			
Total marks							**320**	**480**	**800**

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II MCA- I Semester

S. No.	Course Code	Subject	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16SAH213	Computer Oriented Operations Research	3	1	-	4	40	60	100
2	16MCA211	Computer Networks	3	1	-	4	40	60	100
3	16MCA212	Data Base Management Systems	4	-	-	4	40	60	100
4	16MCA213	Software Engineering	4	-	-	4	40	60	100
5	16MCA214	Web Programming	3	1	-	4	40	60	100
6	16MCA215	Data Base Management SystemsLab	-	-	3	2	40	60	100
7	16MCA216	Web Programming Lab	-	-	3	2	40	60	100
8	16MCA217	Unix Lab	-	-	3	2	40	60	100
Contact periods per week			**17**	**3**	**9**				
Total periods per week			**29**						
Total credits(5 Theory+3 Labs)						**26**			
Total marks							**320**	**480**	**800**

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II MCA- II Semester

S. No.	Course Code	Subject	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16MCA221	Data Warehousing & Data Mining	3	1	-	4	40	60	100
2	16MCA222	Object Oriented Analysis & Design (using UML)	4	-	-	4	40	60	100
3	16MCA223	Cloud Infrastructure and Services	4	-	-	4	40	60	100
4	16MCA224	Elective – I	4	-	-	4	40	60	100
5	16MCA225	Elective – II	4	-	-	4	40	60	100
6	16MCA226	Data Warehousing & Data Mining Lab	-	-	3	2	40	60	100
7	16MCA227	Object Oriented Analysis & Design Lab	-	-	3	2	40	60	100
8	16MCA228	Reasoning, Aptitude and Technical Lab	-	-	3	2	40	60	100
Contact periods per week			**19**	**1**	**9**				
Total periods per week			**29**						
Total credits(5 Theory+3 Labs)						**26**			
Total marks							**320**	**480**	**800**

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ELECTIVE- I

S.No	Subject Code	Subject	Scheme of Instructions Periods per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16MCA224A	Software Project	4	-	-	4	40	60	100
2	16MCA224B	. NET Technologies	4	-	-	4	40	60	100
3	16MCA224C	Embedded Systems	4	-	-	4	40	60	100

ELECTIVE- II

S.No	Subject Code	Subject	Scheme of Instructions Periods per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16MCA225A	Web Services	4	-	4	4	40	60	100
2	16MCA225B	Information Security	4	-	4	4	40	60	100
3	16MCA225C	Artificial Intelligence	3	1	4	4	40	60	100

MCA DEPARTMENT

III MCA- I Semester

S. No.	Course Code	Subject	Scheme of Instruction Periods per week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16MCA311	Software Testing	4	-	-	4	40	60	100
2	16MCA312	Big Data Analytics	3	1	-	4	40	60	100
3	16MCA313	Mobile Application Using Android	3	1	-	4	40	60	100
4	16MCA314	Elective – III	4	-	-	4	40	60	100
5	16MCA315	Elective – IV	4	-	-	4	40	60	100
6	16MCA316	Software Testing Lab	-	-	3	2	40	60	100
7	16MCA317	Big Data Analytics Lab	-	-	3	2	40	60	100
8	16MCA318	Mobile Application Using Android Lab	-	-	3	2	40	60	100
Contact periods per week			**18**	**2**	**9**				
Total periods per week			**29**						
	Total credits(5 Theory+3 Labs)					**26**			
	Total marks						**320**	**480**	**800**

MCA DEPARTMENT

ELECTIVE-III

S.No	Subject Code	Subject	Scheme of Instructions Periods per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16MCA314A	Information Retrieval systems	3	1	-	4	40	60	100
2	16MCA314B	Web Mining	4	-	-	4	40	60	100
3	16MCA314C	Semantic Web	3	1	-	4	40	60	100

ELECTIVE-IV

S.No	Subject Code	Subject	Scheme of Instructions Periods per Week				Scheme of Examination Maximum Marks		
			L	T	P	C	Internal Exam	External Exam	Total
1	16MCA315A	Internet of Things	3	1	-	4	40	60	100
2	16MCA315B	Design Patterns	4	-	-	4	40	60	100
3	16MCA315C	Ethical Hacking	4	-	-	4	40	60	100

III MCA- II Semester

S. No.	Course Code	Name of the Course	Credits	Maximum Marks		
				Internal Exam	External Exam	Total
1	16MCA321	Comprehensive Viva-Voce	2	100	-	100
2	16MCA322	Project Seminar	2	100	-	100
3	16MCA323	Project Dissertation / Thesis	12	40	60	100
		Total	**16**	**240**	**60**	**300**

MCA DEPARTMENT

I MCA - I Semester	L	T	P	C
	3	1	0	4

16MCA111   DISCRETE STRUCTURES AND AUTOMATA THEORY

PREREQUISITES: Undergraduate level Mathematics.

Course Educational Objectives:

CEO1 To acquire the knowledge of logical operations and predicate calculus needed for computing skill

CEO2 To acquire the basic knowledge of set theory, functions and relations concepts needed for designing and solving problems.

CEO3 Apply the acquired knowledge of formal languages to the engineering areas like Compiler Design.

CEO4 Apply the acquired knowledge of finite automata theory and design discrete problems to solve by computers.

CEO5 To acquire the knowledge ofFinite Automata and the Construction of Finite Automata from the Regular expression.

Syllabus:

UNIT -1 :   Mathematical Logic and Predicates

Propositions, Logical Connectives, Conditionals and Biconditionals, Well formed formulas, tautologies, Logical Equivalences, Theory of Inference for Statement Calculus, Predicate Calculus,   Free & Bound variables, Inference Theory of Predicate Calculus.

UNIT - 2 :   Relations and Functions

Introduction, Properties of Binary Relations, Closure of Relations, Warshall's Algorithm, Equivalence Relations and Partitions, Partitional Ordering Relations, Compatible Relation, Functions – Composition of Functions, Recursive Functions, Pigeon Hole Principles & Its Applications.

UNIT - 3 :   Recurrence Relations

Generating Functions - Recurrence Relations – Linear Recurrence Relations with constant coefficients, Homogeneous Solutions, Particular Solutions, Total Solutions, Solution by Method of Generating Functions.

UNIT - 4 :   Graphs , Trees

Introduction, Basic terminology, Multigraphs and Weighted Graphs, Digraphs and Relations, Representation of Graphs, Operations on Graphs, Paths and Circuits, Graph traversals-Traversing of a Graph, Depth-First Search , Breadth-First Search.

Euleran Paths and Circuits, Hamiltanian Paths and Circuits, The Travelling Salesperson Problem.Trees – Trees, Spanning Trees, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm.

UNIT - 5 :   Introduction to Automata, Automata with output, Regular Expression and Languages.

Alphabets, String , Languages, Finite Automata (FA) , Transition Graph, Simpler Notation for DFA's, The language of a DFA, Non determinism, Minimization of DFA's .

Introduction, Moore Machine, Mealy Machine, Equivalence of Mealy and Moore Machine's.Regular Expressions, Comparative Study of Regular Expression, Regular Sets and Finite Automata, Construction of FA for Regular Expression, Construction of Regular Expression from DFA.

Course Outcomes:
On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Check** the validity of the verbal or Symbolic arguments using rules of inference and **Construct** verbal arguments with predicates in symbolic form and also validate them.	PO1,PO2,PO3, PO5,PO6
CO2	**Defining** the Properties of relations, checking the transitive closure of relation, Partial order relation, Inverse functions and	PO1,PO2,PO3, PO5,PO6

	Recursive functions based problems.	
CO3	**Solving** the homogeneous and non-homogeneous linear recurrence relation with constant co-efficient.	PO1,PO2,PO3, PO5,PO6
CO4	**Applying** the Knowledge of Graph Theory to solve real life problems like Construction of telephone network, Railway track, Traveling Salesperson problem.	PO1,PO2,PO3, PO4,PO5,PO6, PO11,PO12
CO5	**Design** of Finite Automata and the **Construct**ion of Finite Automata from the Regular expression and vice-versa.	PO1,PO2,PO3, PO4,PO5,PO6, PO11,PO12

TEXT BOOKS:

1. Elements of Discrete Mathematics- A Computer Oriented Approach, 4/e, 2010, C.L.Liu, D.P. Mohapatra, Tata McGraw-Hill , New Delhi.

2. Discrete Structures and Automata Theory , 2007, Rakesh Dube, Adesh Pandey, Ritu Gupta, Narosa Publishing House, New Delhi.

REFERENCE BOOKS:

1. Discrete Mathematics for Computer Scientists & Mathematicians, 2/e, 2006, J.L.Mott, A. Kandel, T.P. Baker, Prentice Hall of India Private Limited , New Delhi.

2. Mathematical Foundation of Computer Science (Discrete Structures) , 2006, Dr. D.S. Chandra Sekharaiah, Prism Books Private Limited, Bangalore.

3. Discrete Mathematics and its Applications, 6/e, 2007, Kenneth H. Rosen, Tata McGraw-Hill

   Publishing Company Limited, New Delhi.

4. Discrete Mathematical Structures, 5/e, 2007, Bernard Kolman, Robert C. Busby, Sharon Cutler Ross, Prentice Hall of India Private Limited, New Delhi.

5. Discrete and Combinatorial Mathematics, 5/e , 2006, Raph P. Grimaldi, B.V. Ramana, Pearson Education , New Delhi.

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)

MCA DEPARTMENT

I MCA- I Semester   **L   T   P   C**

                                                               4   0   0   4

16SAH117   **TECHNICAL ENGLISH**

PREREQUISITES: Graduate level English

Course Educational Objectives:

CEO1   To enhance communication skills of the students of engineering both technically and literally to face the global competitions in future.

CEO2   Importance is given on all the four skills i.e LSRW.

CEO3   Encourage the students to use the target language in the way of interactive and learner-centered.

CEO4   Ignite the habit of reading and critical thinking skills.

CEO5   To use effective English words to write their project reports.

Unit - 1 : Functional Grammar

Tenses - Articles - Concord - Detection of Errors

Unit - 2 : Communicative Skills

Communication - Verbal and non-Verbal Communication - Channels of Verbal Communication - Barriers to Effective Communication- Cross-cultural Communication

Unit - 3 : Preparing for a Public Presentation

Types of Presentations - Video conferencing - Participation in meetings - Chairing sessions

Unit - 4 : Reading and Listening comprehension skills:

Introduction to Reading - Reasons for Poor Reading - Improving Reading skills - Skimming and Scanning - Non verbal signals - Structure of the text - Punctuation - Author's View point- Reader's Anticipation - Introduction to Listening - Types of Listening - Barriers to good listening - Qualities of a good Listener.

Unit - 5 : Communication for Writing Purpose

Written Communication - Merits and Limitations- Channels - Differences between Spoken and Written Communication - Features of effective writing such as Clarity – Brevity - Appropriate tone etc. - Letter Writing - Business letters - Formats - Style and Tone- Email- Guidelines - Advantages - Disadvantages- Technical Report writing and types.

Course Outcomes:

On successful completion of course, the student will be able to:

COURSE OUTCOMES		
CO1	**Understand** the proper usage of grammar in one's career development as a lifelong learning.	PO1, PO9
CO2	**Understand** the importance on speaking skills by applying good vocabulary.	PO1,PO7
CO3	**Understand** the use of proper body language skills while giving Power Point presentations.	PO1,PO7, PO10
CO4	Individual **knowledge** on Reading and Listening skills.	PO1, PO11
CO5	**Understand** how to use effective English words to write their project reports.	PO10, PO11

REFERENCE BOOKS:

1. Effective Technical Communication, 2006, M.Ashraf Rizvi, Tata Mc Graw-Hill, New Delhi.

2. Basic Communication Skills for Technology, 2/e, 2001, Andrea J.Rutherford, Pearson education Asia New Delhi.

3. GRE and TOEFL: Kaplan and Baron's English in Mind, 4/e, Herbert Puchta and Jeff Stranks, Cambridge.

4. Communication Skills, N/e, 2009, Lenne Sen Prentice Hall of India Pvt Ltd., New Delhi.

5. Communication at work, Ronald B.Adler, Seanne Marquardt Elmhurst, Mc Graw Hill International editions.

6. Oxford Practice Grammar with Answers, 2002/e, John Eastwood, Oxford, New Delhi.

MCA DEPARTMENT

I MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA 112   MANAGEMENT FOR COMPUTER PROFESSIONALS

PREREQUISITES: No prerequisite is required.

Course Educational Objectives:

CEO1   Students will be able to have a clear understanding of the managerial functions.

CEO2   To familiarize themselves with the practice of management, to develop an understanding of behavioral process of the organizations as a whole, and to cultivate an insight into the individual behavior at work place.

CEO3   Students will also gain some basic knowledge on international aspect of management.

CEO4   Conceptualize supply chain designs, which are aligned with business models for manufacturing and service companies

CEO5   Configure logistics networks and assess their performance impacts on efficiency and service levels.

Syllabus:

UNIT - 1 :   Background of Modern Management

Nature and Importance of Management, Development of Management Thought, Ethical and Environmental Foundations, Decision Making,

UNIT - 2 :   Functions in the Management Process

Organizing and Staffing, Planning and Strategic Management, Leadership, Communicating and Controlling.

UNIT - 3 :   Applications of Managerial Functions

Operations Management, Multinational Management, Managing Information.

UNIT - 4 :   E- Supply Chain Management

Supply Chain Management: Introduction- Importance and Overview of Supply Chain Management ,Decision Phases in the Supply Chain, Process view of Supply Chain, Nature and Scope of Supply Chain.

Integrated Supply Chains, Integrated Supply Chain Management, Supply Chains and Competitive performance, Evolution of Supply Chain Management, Focus areas in Supply Chain Management.

UNIT - 5 : ITIL Process

Incident Management. Change Management. Problem Management, Configuration Management, Release Management, Service Level Management, Continuity Management, Security Management, Capacity Management

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Demonstrate** the concepts of Management.	PO1,PO2
CO2	**Apply** the functions in the Management process.	PO1,PO2, PO12
CO3	**Analyze** the Applications of managerial functions.	PO1,PO2, PO12
CO4	**Outline** the Supply Chain Management and Integrated Supply Chain Management.	PO1,PO2, PO12
CO5	**Select** the real process of software industry management from ITIL process.	PO1,PO2, PO12

TEXT BOOKS:

1. Essentials of Management, 4/e, 2007, Joseph L. Massie, PHI, New Delhi.
2. Logistics and Supply Chain Management,1/e,2007, K. Shridhara Bhat, Himalaya Publishing House, New Delhi.
3. The ITIL Foundation Exam Study Guide, 3rd Edition, 2005, Scott Braden, Briarcove Drive, Richardson, USA

REFERENCE BOOKS:

1. Principles of Management, 2007, M Govindarajan & S Natarajan, PHI, New Delhi.
2. Personnel Management, 2/e, 2007,Arun Monappa & Mirza, Tata McGrew-Hill, New Delhi.
3. TechExcel ITIL Guide, Pink Certified.
4. Production & Operation Management,2/e, 2007, R Panneerselvam, PHI, India.

MCA DEPARTMENT

I MCA - I Semester	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

16MCA 113   **PROGRAMMING IN C**

PREREQUISITES: No prerequisite as such. Knowledge on Information Technology and Logical Skills may be helpful.

Course Educational Objectives:

CEO1 To explore the fundamental concepts of C

CEO2 To Learn Basic C Functions and Pointers

CEO3 To Explore Basic C Structures and Unions

CEO4 To understand the processing of files

Syllabus:

UNIT - 1 : Introduction to Computers:

Computer systems, Computer hardware, computer software, computing environments, computer languages, writing, editing, compiling and linking programs, program execution, algorithm and flowchart.

Introduction to Problem Solving: The problem solving aspect, top – down design, implementation of algorithms, program verification and efficiency of algorithms.

UNIT - 2 :   Introduction to the C language

The Structure of the C Program, Introduction, Identifiers, Variables, Constants, Data Types,Type Conversion,Operators & Expressions, Input & output in C, Decision Statements,Loop Control Statements, Arrays, Working with Strings and Standard Functions.

UNIT - 3 :   Pointers and Functions

Introduction, Features of Pointers, Pointer Declaration, Arithmetic Operations with Pointers, Pointers and Arrays, Pointers and Two Dimensional Arrays, Array of Pointers, Pointers to Pointers

Introduction, Definition, Declaration, Return Statement, Types of Functions, Call by Value and Reference, Function as an argument, Function with Operators, Recursion.

UNIT - 4 :   Structures and Unions

Introduction, Features of Structures, Declaration and Initialization of Structures, Array of Structures, Structures and Functions, Enumerated data type, Union.

UNIT - 5 :   File Handling

Files – Introduction, Streams and File Types, Steps for File Operations, File I/O, Structures Read and Write, Other File Functions, Command Line Arguments, Application of Command Line Arguments.

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Demonstrate** above basic understanding of computer fundamental and problem solving techniques	PO1,PO2
CO2	**Demonstrate** about the knowledge of C, different types of logical constructs using looping and processing arrays and strings	PO!,PO2,PO3
CO3	**Create** user defined functions for developing program based on the rules for predefined function and originate pointers with different combination for developing program	PO1,PO2, PO3
CO4	**Examine** the basic construct of structure and union operation	PO1,PO2, PO3
CO5	**Organize** the logical construct of file processing methodology.	PO1,PO2,PO3, PO4

TEXT BOOKS:

1. A Structured Programming Approach using C, Behrouz A. Forouzan and Richard F. Gilberg, Cengage Learning, 2ndEdition.

2. "C and Data structures", Ashok N. Kamthane, 2009, 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. Data Structures using C and C++ , 2/e, 1999, A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Prentice Hall of India Private Limited, New Delhi.

4. C and Data Structures, 1/e, 2010, Dr. N.B. Venkateswarlu, Dr. E.V. Prasad, S. Chand & Company Limited, New Delhi.

5. Mastering C, 2007, K.R. Venugopal and S.R. Prasad, Tata Mcgraw-Hill, New Delhi.

MCA DEPARTMENT

I MCA - I Semester	L	T	P	C
	3	1	0	4

16MCA 114   COMPUTER ORGANIZATION

PREREQUISITES: No prerequisite as such. Knowledge on Information Technology and Logical skills may be helpful.

Course Educational Objectives:

CEO1 To understand how computers are constructed out of a set of functional units

CEO2 To understand how these functional units operate, interact and communicate

CEO3 To understand the factors and tradeoffs that affect computer performance

CEO4 To understand concrete representation of data at the machine level

CEO5 To understand how computations are actually performed at the machine level

Syllabus:

UNIT - 1 :   Digital Logic Circuits and Digital Components

Logic gates, Boolean Algebra, Map Simplification, Combinations Circuits, Flip flops, Sequential Circuits. Integrated circuits, Decoders, Multiplexers, Registers, Shift Registers, Binary Counters, Memory unit.

UNIT - 2 :   Data Representation , Register Transfer & Microoperations

Data types, Complements, Fixed point representation, Floating point representation, Other binary codes, Error detection coders.

Register Transfer Language, Register Transfer, Bus and memory Transfer, Arithmetic micro operations, Logic Micro operations, Shift micro operations, Arithmetic logic shift unit.

UNIT - 3 :   Basic Computer Organization

Instruction codes, Computer registers, Computer instructions, Timing and control, Instruction cycle, Memory-reference instruction, Input-output and interrupt.

UNIT - 4 :   Pipeline and Vector Processing

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

UNIT - 5 :   The Memory

Some Basic Concepts, Semiconductor Ram Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Understand and model** the structure and functioning of a digital computer and can deal with organizational and architectural issues of a digital computer.	PO1,PO3, PO4
CO2	**Interpret** how computers represent and manipulate data internally.	PO1,PO2, PO3
CO3	**Conceptualize** basic computer organization and Differentiate between Instruction cycle and interrupt cycle.	PO1,PO3, PO4
CO4	**Conceptualize** instruction level parallelism for high performance processor design.	PO1,PO3, PO4,PO5
CO5	**Explain** memory hierarchy and its impact on computer cost and performance.	PO1,PO2, PO3,PO4

TEXT BOOKS :

1. Computer System Architecture, 3/e, 2007, M. Morris Mano, Prentice-Hall of India, New Delhi. [UNIT 1,2,3,4]
2. Computer Organization, 4/e, 1996, V. Carl Hamacher, Zvonko G.Vranesic, Safwat G.Zaky, The McGraw-Hill Companies, Singapore. [UNIT 5]

REFERENCE BOOKS :

1. Computer Architecture, Carter Nicholas, 2008, Schaum outline Series, Tata McGraw-Hill, New Delhi.
2. Computer Architecture: Pipelined and Parallel Processor Design, 2002, Michael J. Flynn, Narosa Publishing House.
3. Computer Architecture and Organization, 3/e, 1998, J.P. Hayes, Tata McGraw-Hill, New Delhi.
4. Computer Architecture – A Quantitative Approach, 3/e, 2010, John L. Hennessy, David A. Patterson, New Delhi.
5. Computer organization & Architecture Designing for performance, 7/e, 2007, William Stallings, Prentice Hall of India, New Delhi.

MCA DEPARTMENT

I MCA - I Semester	L	T	P	C
	0	0	3	2

16MCA 115   PROGRAMMING IN C LAB

PREREQUISITES: A Course on "Programming in 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 Know the role of Functions involving the idea of modularity.

CEO5 Learn concept of Array and pointers dealing with memory management and files and Learn about structures and unions

Syllabus:

1. Write a C program to find biggest among 3 numbers.

2. Write a C program to find sum of first n numbers.

3. Write a C program to find multiplication table for a given input value.

4. Write a C program to print all prime numbers between 100 and 500.

5. Write a C program to generate Fibonacci series for a given input.

6. Write a C program to obtain sum of the first 10 terms of the following series for any Positive integer value of X: $X + X3/3! + X5/5! ! + X7/7! + \ldots$

7. Write a C program to reverse the digits of a given number. For example, the number 9876 should be returned as 6789.

8. Write a C function, str_search(char* s1,char* s2, int n) , that takes two strings and an integer, as arguments and returns a pointer to the nth occurrence of 1st string s1 in 2nd string s2, or NULL if it is not present.

9. Write a C function to remove duplicates from an ordered array. For example, if input array contains 10,10,10,30,40,40,50,80,80,100 then output should be 10,30,40,50,80

10. Apply recursive call in C to do the following:

    (i)   Find the factorial of a given number.

    (ii)   Compute Nc_r value

11. Write a C program which will arrange the positive and negative numbers in a one-dimensional array in such a way that all positive numbers should come first and then all the negative numbers will come without changing original sequence of the numbers.

    Example:

    Original array contains: 10,-15,1,3,-2,0,-2,-3,2,-9

    Modified array: 10,1,3,0,2,-15,-2,-2,-3,-9

12. Write a C program to convert uppercase characters in a string to lowercase without using string function

13. Write a C program to convert the two-dimensional array into one-dimensional array

14. Write a C program for concatenation two strings without using string.h header file.

15. Write a C program to extract words form any text file and store in another file. Sort the words in alphabetical order and store them in the same file. Read the sorted file and print the frequency of each word.

16. Write a C program to find Binary Equivalent of a given number.

17. Write a C program that converts Roman numeral into an Arabic integer and vice versa.

18. Write a C program to determine if the given string is a palindrome or not.

19. Write a C program to display the Following pattern called Floyed's Triangle.

    1
    2   3
    4   5   6
    7   8   9   10
    11   12   13   14   15

20. Write a C program to print the following patterns

    a.   1   b.   1   c.   1 2 3 4 5
          2 2   1 2   1 2 3 4
          3 3 3   1 2 3   1 2 3
          4 4 4 4   1 2 3 4   1 2
          5 5 5 5 5   1 2 3 4   1 2
          6 6 6 6 6 6   1 2 3 4 5   1

21. Write a C program to generate Pascal's triangle

22. Write a C program to construct Pyramid of numbers.

23. Write a C program to perform addition of two given matrices.

24. Write a C program to perform multiplication of two given matrices.

25. Write a C program to find the transpose of a given matrix.

26. Write a C Program to Perform

    a) Linear Search

    b) Binary Search

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Demonstrate** the knowledge on basic usage of operators, datatypes, variable declaration, looping & branching, arrays, strings, pointers, structures & union and files	PO1
CO2	**Analyse** & Develop an algorithm for every problem to be solved	PO2
CO3	**Implement** every program based logic involved in Algorithm	PO3
CO4	**Test** every program for different inputs to get effective solutions	PO4
CO5	**Use** appropriate software to implement program and to obtain solution	PO5
CO6	**Relate** programming principles to implement every program	PO8
CO7	**Inspect** every program individually for effective practice	PO9
CO8	The result and bugs of every program is **observed** and **recorded** in observation	PO10
CO9	**Assess** the technological changes in which it correlates to change and need	PO12

MCA DEPARTMENT

I MCA - I Semester	L	T	P	C
	0	0	3	2

16MCA116   INFORMATION TECHNOLOGY LAB

PREREQUISITES: No prerequisite as such. Knowledge on operating computer System may be helpful.

Course Educational Objectives:

To train the student on:

CEO1   Identification of Functional parts of PC

CEO2   Practicing basic operation of operating system commands

CEO3   To apply knowledge and skills of IT to create word documents, excel spread sheets, power point presentations, database using Ms-access and maintenance of PC.

Syllabus:

1. **Identifying of various hardware parts and usage of System**
2. **Implementing DOS Commands**
3. **Implementing Windows basic operations**
4. **Implementing 6 exercise using following options in MS Word**

Introduction to MSWord, Menus, Shortcuts, Document types, Opening Files - New & Existing, Saving Files, Formatting page and Setting Margins, Converting files to different formats- Importing, Exporting, Sending files to others, Editing text documents , Inserting,. Deleting,. Cut, Copy, paste, Undo, Redo, Find, Search, Replace, Using Tool bars - Ruler , Using Icons

Setting Font Styles - Font selection, style, size, color etc., Type face - Bold Italic, underline, Case settings, Highlighting, Special symbols, Setting Paragraph style – Alignments, Indents, . Line space, Margins, Bullets and Numbering, Setting Page Style – Formatting, Border& Shading, Columns, Header & footer, Setting Footnotes, Inserting manual Page break, Column break and line break, Creating sections and frames, Inserting Clip arts, pictures, and other files, Anchoring & Wrapping, Setting Document Styles - Table of Contents, Index, Page Numbering, data &Time, Author etc.

Table settings, Borders, Alignments, Insertion, deletion, Merging,Splitting, Sorting, Inserting Pictures/Files etc., Drawing Pictures, Formatting &Editing pictures, Grouping and ordering, Rotating. Spell Checks, Mail merge, Security

5. **Implementing 6 exercise using following options in MS Excel**

Spreadsheet & its Applications, Opening spreadsheet, Menus & Toolbars & icons, Shortcuts, Shortcuts

Opening a File, Saving Files, Setting Margins, Converting files to different formats, Importing, Exporting and Sending files to others, Spreadsheet addressing- Rows, Columns & Cells, Referring cells and Selecting cells., Entering and Editing Data - Entering Data, Cut, Copy, paste, Undo, Redo, Find, Search & Replace, Filling continuous rows, columns, Inserting - Data, cells, column, rows & sheets, Manual breaks., Computing data - Setting Formula, Finding total in a column or row, Mathematical operations (Addition, Subtraction, Multiplication, Division, Exponentiation), Using other Formulas

Formatting - Cell, row, column & Sheet,Alignment, Font, Border&shading, Highlighting values, Hiding/Locking Cells., Worksheet - Sheet Name, Row& Column Headers, Row Height, Column Width, Visibility - Row, Column, Sheet, Security, Formatting worksheet - Sheet Formatting & style - background, color, Borders & shading, Anchoring objects, Formatting layout for Graphics, Clipart etc.,

 Sorting,Filtering,Validation,Consolidation,Subtotal, Selecting charts -Formatting charts, label, scaling etc.,

6. **Implementing 2 exercise using following options in MS power point**

Opening new Presentation, Different presentation templates, Setting backgrounds, Selecting presentation layouts. Setting presentation style, Adding Text to the presentation,Adding style, Color, gradient fills, Arranging objects, Adding Header & Footer, Slide Background, Slide layout, Inserting pictures, movies, tables, etc into the presentation,Drawing Pictures using Draw,Setting Animation & transition effect , Adding audio and video

7. **Implementing 2 exercise using following options in MS Access**

Database concepts, Tables, Queries, Creating Tables, Table Design, Indexing,Entering data, Importing data

8. **Usage of MS Outlook**

Course Outcomes:

At the end of the course, students will be able to

	COURSE OUTCOMES	POs related to COs
CO1	**Apply** Knowledge of Information Technology to identify various parts of the PC and Operating System functionalities	PO1
CO2	**Analyze** the data and generate reports for decision making	PO2
CO3	**Design** documents and presentations Using word processor and PowerPoint	PO3
CO4	**Experiment** various MS office elements by designing documents, database and reports as per the requirement.	PO4
CO5	**Engage** in identifying new tools and techniques to make the work faster and effective.	PO5
CO6	**Practice** of ethical code of conduct in the usage of computer hardware and software.	PO8
CO7	Doing **experiment**s effectively as an individual and as a member in a group.	PO9
CO8	**Communicate** verbally and in written form to express the problems and solutions in an easy manner.	PO10
CO9	**Updating** their skill related to various editing techniques, shortcuts, report generation for various applications during their life time.	PO12

MCA DEPARTMENT

I MCA- I Semester	L	T	P	C
	0	0	3	2

16SAH118   ENGLISH COMMUNICATION SKILLS LAB

PREREQUISITES: A course on "Technical English"
Course Educational Objectives:

The syllabus has been designed

CEO1   To enhance communication skills especially in listening, speaking with confidence, read variety of materials and to improve their writing skills effectively.

CEO2   Enable students to learn better pronunciation by using proper phonetic sounds with accurate word accent.

CEO3   Train students to give PowerPoint presentations, participation in Group Discussion and facing Interviews with confidence.

Syllabus:

The following course content is prescribed for the English language laboratory practice

1. Introduction to the sounds of English - Vowels - Consonants - Diphthongs
2. Introduction to Stress
3. Inflections - Plural Morphemes - Past Tense Marker
4. Reading Skills
5. Book Review
6. Listening Skills (TED talks)
7. Oral presentations- Prepared - Extempore
8. Resume Writing - Cover Letter
9. Group Discussion
10. Interview Skills

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Course Outcomes:

On successful completion of course, the student will be able to:

	COURSE OUTCOMES	POs Map with COs
CO1	**Communicate** effectively using phonetic sounds	PO1
CO2	**Demonstrate** in using contemporary English while Communicating.	PO10
CO3	**Display** self confidence by performing presentation skills and Role plays.	PO10
CO4	**Make** good presentations with effective writing skills	PO10
CO5	**Exhibit** one's candidature to participate in discussion in group to get individual confidence.	PO9

REFERENCE BOOKS:

1. Developing Communication Skills, 2/e, 2009, Krishna Mohan & Meera Benerji, Macmillan, New Delhi.

2. Speaking English effectively 2/e, 2009,Krishna Mohan & N.P. Singh, Macmillan, New Delhi.

3. Oxford Practice Grammar with Answers, 2002/e, John Eastwood, Oxford, New Delhi.

4. Handbook of English Grammar and Usage, 2006, Mark Lester and Larry Beason, Tata McGraw-Hill, New Delhi.

5. A text book of English phonetics for Indian students, 2007, T. BalaSubramanian, Macmillan, New Delhi.

6. GRE and TOEFL: Kaplan and Baron's English in Mind, 4/e, Herbert Puchta and Jeff Stranks, Cambridge.

7. Everyday Dialogues in English, 2006, Robert J.Dixson, Prentice – Hall, New Delhi.

8. Effective Technical Communication,2005, M.Ashraf Rizvi,Tata Mc Graw-Hill, New Delhi.

I MCA- II Semester	L	T	P	C
	3	1	0	4

16SAH123   **PROBABILITY AND STATISTICS**

PREREQUISITES: Basic Mathematics

Course Educational Objectives

CEO1 Explain simple unconditional probabilities and conditional probabilities

CEO2 Define the probability mass function of a discrete random variable and the binomial distribution

CEO3 Define the probability density function of a continuous random variable and the normal distribution

CEO4 Define the expectation of a function of a random variable and Define critical values

CEO5 Derive confidence intervals for population parameters and Derive hypothesis tests for population parameters

CEO6 Derive the Chi - Square Test of Independence for a contingency table and Derive the linear regression parameter estimates and correlation coefficient

Syllabus:

UNIT - 1 :   Probability and Random variables

Probability: Sample space and events - Probability - The axioms of probability - Some elementary theorems - Conditional probability - Baye's theorem.

Random variables: Discrete and continuous distributions - Distribution functions.

UNIT - 2 :   Probability Distributions

Binomial - Poisson and Normal distributions - Related properties.

UNIT - 3 :   Sampling distribution and Estimation

Sampling distribution: Populations and samples - Sampling distributions of mean (known and unknown) - Proportions - Sums and differences.

Estimation: Point estimation - Interval estimation - Bayesian estimation.

UNIT - 4 :   Test of Hypothesis and Test of Significance

Test of Hypothesis: Means - Hypothesis concerning one and two means - Type I and Type II errors - One tail, two-tail tests.

Test of Significance: Student's t-test - F-test - Chi-square test of goodness of fit.

UNIT - 5 :   Curve fitting & ANNOVA

Curve fitting: The method of least squares – Linear, Parabola, Exponential and Power form.

ANNOVA: ANNOVA for one-way and two-way classification data.

Course Outcomes:

After the completion of this course, a successful student is able to

COURSE OUTCOMES		POs related to
CO1	**Demonstrate** knowledge on use the probability and Random Variables in the field of engineering	PO1,PO2, PO3
CO2	**Demonstrate** knowledge in probability distributions and **develop** analytical skills for the problems involving means, probability distributions and standard deviations sampling techniques for decision making in uncertain environments	PO1,PO2, PO3
CO3	**Construct** confidence intervals on parameters for a single sample	PO1,PO2, PO3,PO12
CO4	**Demonstrate** knowledge in testing of hypotheses and Tests of significance for small and large samples and **Develop** skills for analyzing the data with suitable tests of significance for practical situations through probability distributions	PO1,PO2, PO3,PO4, PO12
CO5	**Demonstrate** knowledge on constructing a curve, or mathematical function, that has the best fit to a series of data points, possibly subject to constraints and develop skills for analyzing to test whether there are	PO1,PO2, PO3,PO4, PO12

TEXT BOOKS:

1. Fundamentals of Mathematical Statistics, 10/e, 2001, S.C. Gupta, V.K. Kapoor, S. Chand and Company Publishers, New Delhi.

2. Probability and Statistics, 2012, T.K.V. Iyengar, B. Krishna Gandhi, S. Ranganatham and M.V.S.S.N. Prasad , S. Chand and Company Publishers, New Delhi.

REFERENCE BOOKS:

1. Probability and Statistics, 2011, V. Ravindranath, T.S.R. Murthy, I.K. International Pvt. Ltd, New Delhi.

2. Probability and Statistics for Engineers, 6/e, 2006, Johnson A. Richard, Miler & Fruends, Pearson Education, New Delhi.

3. Higher Engineering Mathematics, 34/e, 1999, Dr. B. S. Grewal, Khanna Publishers, Delhi

4. Probability and Statistics for Engineers, 2011, Dr. J. Ravichandran, Wiley-India Publishers, New Delhi.

5. Probability and Statistics for Engineers and Scientists, 7/e, 2002, Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Pearson Education Asia, New Delhi.

MCA DEPARTMENT

I MCA - II Semester	L	T	P	C
	3	1	0	4

16MBA128   ACCOUNTING AND FINANCIAL MANAGEMENT

PREREQUISITES: No prerequisite is required.

Course Educational Objectives:

CEO1 To Learn Accounting procedure

CEO2 To know financial position of a company

CEO3 To find out various sources   of finance

CEO4 To take investment decision on   projects

Syllabus:

UNIT - 1 : **Accounting   process**

Definition, principles: Concepts and conventions –Accounting process-Double entry system-classification of accounts- Debit and credit rules of various accounts-Journal-Ledger-Trial Balance – preparation of final Accounts(sole proprietorship)

UNIT - 2 : **Ratio Analysis**

Meaning, nature, uses and significance of Ratios classification of Rations-Profitability Ratios-Liquidity Ratios-Activity Ratios-Solvency Ratios

UNIT - 3 : **Introduction to Finance Management**

Capitalization - Meaning, need, types, capital structure and financial structure.

Sources of Finance: Short term finance and long term finance.

UNIT - 4 : **Capital Budgeting Techniques**

Meaning, Need of capital Budgeting. Traditional Methods - payback period method, Accounting Rate of Return Method.

Discounted cash flow methods- Net present value method, internal rate of return method, profitability index method (simple problems).

UNIT - 5 : **Break Even Analysis and its Application**

 Contribution, p/v Ration, c-v-p Analysis-uses and significancy, BEP chart, Margin of safety.

Make a Buy Decision, problem of key or limiting factor, selection of suitable product mix, Effects of charges in selling price, variable cost.

Course Outcomes:

After the completion of this course, a successful student is able to

COURSE OUTCOMES		
CO1	**Demonstrate** knowledge on accounting principles and procedures.	PO1,PO2,
CO2	**Examine** the financial health of companies.	PO1,PO2,PO3
CO3	Taking **managerial** decisions regarding financial management.	PO1,PO2,PO3,PO4
CO4	Taking investment decisions by **applying** capital budgeting.	PO1,PO2,PO3,PO4
CO5	**Control** the costs and maximizing profits of companies	PO1,PO2,PO3,PO11

TEXT BOOKS:

1. Financial Accounting and Policy, R.M.Srivastava, e/3, 2007, Himalaya Publishing House Pvt. Ltd. Mumbai.

2. Accounting for Management, T.Vijay Kumar, e/1, 2010, Tata McGraw Hill Education Pvt. Ltd. New Delhi.

REFERENCE BOOKS:

1. Financial Accounting, N.Ramachandran and Rama Kumar Kakani, e/2, 2009, Tata McGraw Hill Education Pvt. Ltd. New Delhi.

2. Financial Management, I.M.Pandey, e/10, 2012, Vikas Publishing House Pvt. Ltd. Noida.

3. Financial Management Principles and Practice, e/1, 2009, Himalaya Publishing House Pvt. Ltd. Mumbai.

4. Financial Accounting, S.N.Maheswari, e/5, 2009,Sultan Chand and Sons Educational Publishers, New Delhi.

5. Cost and Management Accounting, e/1, 2007-08, Himalaya Publishing House Pvt. Ltd. Mumbai Financial Accounting, Tulsian, S Chand, 2009.

MCA DEPARTMENT

I MCA - II Semester	L	T	P	C
	3	1	0	4

16MCA121   OBJECT ORIENTED PROGRAMMING THROUGH JAVA

PREREQUISITES: A course on "Programming in C"

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 and To Create Multiple Threads using Java

Syllabus:

UNIT - 1 :   Fundamentals of Object-Oriented Programming & Java Evolution

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.

UNIT - 2 :   Inheritance, Interfaces and Packages

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 - 3 :   Interfaces and Collection Framework

Interfaces-Defining an Interface, Implementing Interfaces, Interfaces can be extended , Collections Overview:The Collection Interfaces – The List Interface, The Set Interface, The Collections Classes - HashSet, Stack, LinkedList, ArrayList,Vector, Accessing a Collection Via an Iterator, String, StringBuffer Class, Utility classes – StringTokenizer, Scanner

UNIT - 4 :   Exception Handling, Multithreading and Applets

.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 - 5 :   Event handling and Swings

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.

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Experiment** Object Oriented Programming Concepts such as class, object, abstraction to solve real world problems using Java.	PO1,PO2, PO3,PO12
CO2	**Explore** how to organize various classes as packages and types of inheritance to solve the given problem	PO2,PO3, PO4, PO5
CO3	**Identify and Solve** problems using java Interfaces and Collection framework	PO2,PO3, PO4, PO5
CO4	**Handle** the run time errors using exceptional handling mechanism and concurrent tasks using threads	PO1,PO2, PO3 , PO5, PO12
CO5	**Design** Internet Applications using java Applets and components of swing package	PO2,PO3

TEXT BOOKS:

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

2. "Programming with Java",3e, , 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.

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(AUTONOMOUS)

MCA DEPARTMENT

I MCA - II Semester	L	T	P	C
	3	1	0	4

16MCA122   OPERATING SYSTEMS

PREREQUISITES: A course on "Computer Organization"

Course Educational Objectives:

CEO1 To be aware of the evolution and fundamental principles of operating system, processes and

CEO2 their communication

CEO3 To understand the various operating system components like process management, memory

CEO4 management and

CEO5 To know about file management and the distributed file system concepts in operating systems

CEO6 To be aware of components of operating system with relevant case study

Syllabus:

UNIT - 1 :   Operating Systems Introduction

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 - Hand Held Systems & Multimedia system. Operating System services - User OS Interface - System Calls - Types of System Calls - System Boot.

UNIT - 2 :   Process Concepts and CPU Scheduling

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 processor.

UNIT - 3 :   Process Coordination & Deadlock

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 - 4 : **Mass Storage Structure & Memory Management**

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 - 5 : **File system Interface & System Protection**

File System Interface : The Concept of a File - Access methods – Directory & Disk Structure - File System Mounting - File Sharing – File System Implementation. **System Protection :** Goals of Protection - Principles of Protection - Domain of Protection. Security Issues - The Security problem - Program threats - System and network threats.

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Demonstrate** the on basic knowledge of operating system components and services	PO1
CO2	**Relate** the different process concepts and CPU scheduling mechanism of operating system	PO1,PO2,PO3, PO5,PO12
CO3	**Illustrate** the different process synchronization and deadlock methodology in operating system	PO1,PO2,PO3, PO5,PO12
CO4	**Compare and Contrast** different memory management techniques in operating systems	PO1,PO2,PO3, PO5,PO12
CO5	**Examine** the various I/O management and File management strategies in Operating System	PO1,PO2,PO3, PO5,PO12

TEXT BOOKS:

1. Operating System Principles , 8/e, Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Wiley Student Edition.

2. Operating Systems – Internals and Design Principles, 6/e, 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.

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I MCA - II Semester	L	T	P	C
	3	1	0	4

16MCA123   **DATA STRUCTURES**

PREREQUISITES: A course on "Programming in C"

Course Educational Objectives:

CEO1 To explore the fundamental concepts of Data Structures

CEO2 To Explore various data Structures like Stack, Linked List, Queues, Trees and Graphs

CEO3 To Understand various Sorting and Searching Techniques

Syllabus:

UNIT - 1 :   Introduction and Overview & Linked lists

Definition, Concept of Data Structures, Overview of Data Structures.

Definition , Single linked lists , Doubly linked lists , Circular linked lists , Circular Double linked lists , Applications of Linked list: Sparse Matrix Manipulation , Polynomial Representation.

UNIT - 2 :   Stacks and Queues

Introduction , Definition , Representation of Stacks- Arrays and Linked lists , Operations on stacks, Applications of stacks-Evaluation of Arithmetic Expression , Implementation of Recursion, Factorial Calculations , Towers of Hanoi.

Introduction , Definition , Representation of Queues- Arrays and Linked lists , Various Queue structures, Operations on Queues , Applications.

UNIT - 3 :   Sorting and Searching

Insertion Sort, Bubble Sort, Selection Sort, Merge Sort, Radix Sort, Quick Sort and Heap sort.Linear Search, Binary Search and Fibonacci Search.

UNIT - 4 :   Trees

Basic Terminologies, Definition and Concepts, Representation of Binary Tree , Operations on Binary Tree - Types of Binary Trees

UNIT - 5 : Graphs

Introduction, Graph Terminologies, Representation of Graphs, Operations on Graphs, Application of Graph Structures

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Explain** the organization and operations of data structures stack, queues, trees, graphs, sorting and searching.	PO1,PO2
CO2	**Compare** and **Contrast** the functionalities and application of different data structures.	PO1,PO2,PO3
CO3	**Demonstrate** specific search and sort algorithms using data structures given Specific user requirements.	PO1,PO2,PO3, PO4
CO4	**Identify**ing suitable algorithms with appropriate data structures for real time software requirements.	PO1,PO2,PO3 PO4,PO5,PO7, PO11,PO12
CO5	**Modify** the existing operations of data structures for changing needs of the software requirements.	PO1,PO2,PO3 PO4,PO5,PO7, PO11,PO12

TEXT BOOKS:

1. Classic Data Structures, 2/e, 2009, Samanta, Prentice Hall of India Private Limited, New Delhi.

2. "C and Data structures", Ashok N. Kamthane, 2009, 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. Data Structures using C and C++ , 2/e, 1999, A.M.Tanenbaum, Y.Langsam, and M.J. Augenstein, Prentice Hall of India Private Limited, New Delhi.

4. C and Data Structures, 1/e, 2010, Dr. N.B. Venkateswarlu, Dr. E.V. Prasad, S. Chand & Company Limited, New Delhi.

5. Mastering C, 2007, K.R. Venugopal and S.R. Prasad, Tata Mcgraw-Hill, New Delhi.

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I MCA - II Semester	L	T	P	C
	0	0	3	2

16MCA124   OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB

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

Syllabus:

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

   c) Linear Search

   d) 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.

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		POs related to COs
CO1	**Apply** Knowledge of OOPS concept Through Java Language to Solve Complex Problems	PO1
CO2	**Analyze** the Real World problems to be solved by Using OOPS concepts like Polymorphism, Inheritance, Encapsulation, etc..	PO2
CO3	**Design** and **Develop** solutions for solving many Real World Problems.	PO3
CO4	**Investigate** for exceptions and handle it using exception Handling Mechanism	PO4
CO5	**Select** appropriate Techniques to implement Stand Alone, Distributed and Internet applications	PO5
CO6	**Follow** ethical principles in developing various types of applications .	PO8
CO7	**Implement** Applications as a Individual or as a Member of the group	PO9
CO8	**Communicate** verbally and in written form about the Applications/Programs developed through the Language.	PO10
CO9	**Continue** updating their skill related to OOPS concepts for **develop**ing applications during their life time	PO12

TEXT 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.

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I MCA - II Semester	L	T	P	C
	0	0	3	2

16MCA125   **OPERATING SYSTEMS LAB**

PREREQUISITES: A course on "Operating Systems"

Course Educational Objectives:

CEO1 The students are inculcate with various algorithms incorporated with Operating System are taught

Syllabus:

1. Write C programs to implement the following i) standard I/O and ii) system calls.
2. Simulate the following CPU scheduling algorithms

    a) SJF b) FCFS   c) Priority   d) Round Robin

3. Simulate the following mutual procedure

    a) Dining Philosopher Problem   b) Peterson Solution c) Bounded Buffer

4. Simulate all file allocation strategies

    a) Sequential   b) Indexed   c) Linked

5. Simulate Bankers Algorithm for DeadLock Avoidance
6. Simulate the following Disk scheduling algorithm

    a) FCFS b) SSTF   c) LOOK   d) C-LOOK

7. Simulate all page replacement algorithms such as

    a) FIFO   b) Optimal c) LRU

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES	
CO1	**Develop** an algorithm to implement logics or every program	PO1,PO2
CO2	**Relate** the different process concepts and CPU scheduling	PO1,PO2,PO3,

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	mechanism of operating system	PO5,PO12
CO3	**Illustrate** the different process synchronization and deadlock methodology in operating system	PO1,PO2,PO3, PO5,PO12
CO4	**Compare and Contrast** different memory management techniques in operating systems	PO1,PO2,PO3, PO5,PO12
CO5	**Examine** the various I/O management and File management strategies in Operating System	PO1,PO2,PO3, PO5,PO12
CO6	**Relate** programming principles to implement every program	PO8
CO7	**Inspect** every program individually for effective practice	PO9
CO8	The result and bugs of every program is **observed** and **recorded** in observation	PO10
CO9	**Assess** the technological changes in which it correlates to change and need	PO12

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I MCA - II Semester	L	T	P	C
	0	0	3	2

16MCA126   DATA STRUCTURES LAB

PREREQUISITES: A course on "Data Structures And Algorithms"

Course Educational Objectives:

CEO1 Stack operations to perform the following: Converting infix expression into postfix expression, Evaluating the postfix expression.

CEO2 Implement Bubble Sort, selection sort and insertion sort method to sort a given list of integers.

CEO3 Demonstrate familiarity with major algorithms and data structures.

Syllabus:

Exercise 1

1. Write C programs that implement stack (its operations) using Arrays.
2. Write C programs that implement Queue (its operations) using Arrays.

Exercise 2

1. Write C Program that implement operations on Stack using Pointers.
2. Write C Program that implement operations on Queue using pointers

Exercise 3

Write a C program that uses functions to perform the following operations using singly linked list   i) Creation   ii) insertion   iii) Deletion   iv) Traversal

Exercise 4

Write a C program that uses functions to perform the following operations using double linked list

i) Creation   ii) insertion   iii) Deletion   iv) Traversal

Exercise 5

Write a C program that uses functions to perform the following operations using Circular linked list

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i) Creation   ii) insertion   iii) Deletion   iv) Traversal

Exercise 6

Write a Program that uses Stack Operations to perform the following

1. Converting infix expression to postfix expression
2. Evaluation the postfix expression

Exercise 7

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

       1. Bubble sort   2. Selection sort

Exercise 8

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

       1. Quick sort   2. Merge sort

Exercise 9

Write a C program using recursive functions to perform the following searching operations for a key value in a given list of integers.

       1. Linear Search   2. Binary Search

Exercise 10

Write a C programs using non - recursive functions to perform the following searching operations for a key value in a given list of integers.

       1. Linear Search   2. Binary Search

Exercise 11

Write a program to create BST and perform operations on it

Exercise 12

1. Write a C program to demonstrate insert operation in binary search tree

2. Write a C Program to Find the Shortest Path Between Two Vertices Using Dijkstra's Algorithm

3. Write a C Program to Apply the Prim's Algorithm to Find the Minimum Spanning Tree of a Graph

Course Outcomes:

On successful completion of the course the student will be able to,

COURSE OUTCOMES		POs
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	Write C programs to **implement** the following linear and Nonlinear Data Structures a)Stack b) Queue c)singly linked list, d) double linked list, e)Circular linked list f) graph h) Tree	PO4
CO5	**Apply** different sorting methods to sort a given list of integers in ascending order and **Execute** the Search operations for a key value in a given list of integers.	PO5
CO6	Follow ethical principles in **Analyzing**, **designing** and **implementing** various Data Structures.	PO8
CO7	Do **experiment**s effectively as an individual and as a member in a group.	PO9
CO8	**Communicate** verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue **updating** their skill related to Data Structures **implementation** for various application during their life time	PO12

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II MCA I Semester	L	T	P	C
	3	1	0	4

16SAH213   COMPUTER ORIENTED OPERATIONS RESEARCH

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 skiils to **Solve** the problem of transporting the products fromorigins 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 – 1:   Basics of operation research and Linear Programming

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 – 2:   Transportation Problem and Assignment Models

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 - 3:   Game theory and Sequencing Models

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 – 4:   Replacement Models, Inventory Models and EOQ Models

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

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.

Course Outcomes:

On successful completion of the course the student will be able to,

COURSE OUTCOMES		
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,PO12
CO2	**Understand** Transportation Problem, Assignment Problem and Analyze and design the data, to synthesize transformation by using	PO1,PO2, PO3,PO12

	operational models like Transportation Problem, Assignment Problem	
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,PO12
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,PO12
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,PO12

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.

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II MCA - I Semester	L	T	P	C
	3	1	0	4

16MCA211   **COMPUTER NETWORKS**

PREREQUISITES: A course on "Computer Organization"

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.

Syllabus:

UNIT - 1 :   Introduction

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

UNIT - 2 :   The Data Link Layer

Data link Layer Design Issues- Elementary Data Link Protocols- Sliding Window Protocols - The Medium Access Control Sublayer: Multiple Access protocols- Ethernet- Ethernet Cabling- Manchester Encoding- The Ethernet MAC Sublayer Protocol- Ethernet Performance, Wireless Lans

UNIT - 3 :   The Network Layer

Network Layer Design Issues- Routing Algorithms, Congestion Control Algorithms- Internetworking- The Network Layer in the Internet

UNIT - 4 :   The Transport Layer

The Transport Service- Elements of Transport Protocols- The Internet Transport Protocols: UDP- TCP.

UNTI - 5 :   The Application Layer

DNS-The domain name system - Electronic mail- The world wide web – Multimedia.

Course Outcomes:

On successful completion of this course, students will be able to

COURSE OUTCOMES		
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, PO3,PO4
CO3	**Explore** network design issues and **Learn** various routing and congestion control algorithms	PO1,PO3, PO4,PO5
CO4	**Describe** the elements of transport layer services and protocols	PO1,PO4
CO5	**Conceptualize** the working nature of the applications such as electronic mail, world wide web and domain name systems.	PO1,PO3, PO5,PO6

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, 2001, 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.

5. Data and Computer Communications,1/e, 2001, G.S.Hura and M.Singhal, CRC Press, Taylor and Francis Group, FL United States.

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II MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA212   **DATABASE MANAGEMENT SYSTEMS**

PREREQUISITES: No prerequisite as such. 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**.**

Syllabus:

UNIT - 1 :   Introduction & Data Modeling using the ER Model

Database System Applications - Purpose of Database Systems - View of Data - Database Languages - Database Design - Database Architecture - Database Users and Administrators.

Data Base Design and ER Diagrams- Entities, Attributes and Entity sets- Relationships and Relationship sets – Additional features of the ER model – Conceptual design with the ER model-EER diagrams - Specialization and Generalization.

UNIT - 2 :   The Relational Model

Structure of Relational Data Bases – Basic Structure, Data Base Schema, Keys, Query Languages.

Relational Algebra And Calculus – Preliminaries – Relational Algebra – Relational Calculus – Expressive power of Algebra and Calculus.

UNIT - 3 :   SQL & PL/SQL

Interactive SQL Part I - Types of Data Constraints - Computations done on Table Data - Oracle functions - Grouping Data from Tables in SQL - Sub queries – Joins -

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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 - 4 :   Relational Database Design & Transaction Management

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 - 5 :   Concurrency Control & Recovery System

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 .

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Gain** an insight into the concepts of Databases System and the basic elements of a relational database management system.	PO1,PO4
CO2	**Identify** the data models and Problem Solving using queries in Relational model.	PO1,PO2
CO3	**Able** to design entity relationship and convert entity relationship diagrams into Relational Database	PO1,PO3
CO4	**Experiment** Normalization and professional attitudes for the development of Consistent Database.	PO1,PO4
CO5	**Conceptualize** Concurrency Control and Recovery Techniques to avoid data anomalies.	PO1,PO2, PO11

TEXT BOOKS :

1. Database System Concepts, 5/e , 2006, Korth, Silbertz, Sudarshan, TATA McGraw- Hill, New Delhi.

2. Data base Management Systems, 3/e, 2003, Raghu Ramakrishnan , Johannes Gehrke, Mc Graw Hill, New Delhi.

3. SQL, PL/SQL Programming, 3/e, 2005, Ivan Bayross, BPB Publications, 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. Oracle Database 10g PL/SQL 101, 1/e, 2004, Christopher Allen, TATA McGraw Hill, New Delhi.

5. Database Management Systems, 1/e, 2002, Alexis Leon and Mathews Leon, Vikas Publishing, New Delhi.

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II MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA213 **SOFTWARE ENGINEERING**

PREREQUISITES: No prerequisite is required. Knowledge on Information Technology may be helpful.

Course Educational Objectives:

CEO1 To Select Appropriate Process Model Apply it to All Stages of Software Development Life Cycle (SDLC).

CEO2 To Select and Apply Appropriate Design Methodology.

CEO3 To Decide the Feasibility of Using and Applying Agile Development Process.

CEO4 Assure Software Quality, Select and Apply Appropriate Testing Strategies.

CEO5 To Select and Apply Appropriate Metrics to Estimate Software Size, Effort, and Cost.

Syllabus:

UNIT - 1 : **Introduction to Software Engineering and A Generic view of Process**

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 - 2 : **Process Models**

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

UNIT - 3 : **Software Requirements and System Models**

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.

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UNIT - 4 :   **Design Engineering& Architecture, Testing Strategies**

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 - 5 :   **Testing Tactics, Software Measurement and Estimation**

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.

Course Outcomes:

On successful completion of this course, students will be able to

COURSE OUTCOMES		
CO1	**Demonstrate** the processes of software development.	PO1,PO2
CO2	**Analyze** the customer business requirements and choose the appropriate Process model for the project.	PO1,PO2, PO12
CO3	**Build** the prototype for Software business case and analyze the requirements of software project.	PO1,PO2, PO12
CO4	**Design** the System based on Architectural styles and Design patterns. .	PO1,PO2, PO3,PO12
CO5	**Design** test cases and Define metrics for standardization and assuring quality standards. .	PO1,PO2,PO3, PO4,PO12

TEXT BOOKS:

1. Software Engineering, A practitioner's Approach, 6/e ,2005, Roger S Pressman, Tata McGraw-Hill International Edition .

2. Software Engineering, 7/e ,2004,IanSommerville, Pearson Education, India.(Units:2,3)

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.

5. Software Engineering – A Supporting Processes, 1/e, 2005, Richard H. Thayer and Merlin Dorfman, Wiley.

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II MCA - I Semester	L	T	P	C
	3	1	0	4

16MCA214   **WEB PROGRAMMING**

PREREQUISITES: A Course on "Object Oriented Programming through JAVA".
Course Educational Objectives:

CEO1 To Learn Basics of HTML and XML.

CEO2 To Understand and practice JavaScript, a client side Scripting language.

CEO3 To Explore Server side Technologies like Servlet and JSP

CEO4 To Explore PHP and MySQL Basics.

Syllabus:

UNIT - 1 :   HTML , XML & JavaScript

HTML- Tables,Basic Text Markup,Images,Lists,Forms,Frames,Introduction to XML –The syntax of XML, XML Document Structure, Document Type Definitions, Introduction to JavaScript, Objects in JavaScripts.

UNIT - 2 :   Servlets & JSP

Life Cycle of a Servlet - A simple Servlet- The Servlet API - The Javax.Servlet Package - Reading Servlet Parameters - The javax.Servlet.HTTP Package - handling Http Request & Responses - using Cookie - Session Tracking, Java Server Pages – Motivation for JSP, JSP Documents, Scriptlets, Expression Language, JSTL Control Action Elements.

UNIT - 3 :   Introduction to PHP

History, General Features, PHP Basics, Code embedding web pages, Commenting the code, Output Data to Browser, Datatypes, Identifiers, Variables,Constructors, Expressions, String Interpolation, Arrays.

UNIT - 4 :   Object Oriented Concepts in PHP

Object Oriented PHP, Object Cloning, Interfaces, Inheritance, Namespace, Error & Exception Handling, working with files & operating system, Date & Time in PHP.

UNIT - 5 :   MySQL Basics

An Overview, MySQL Architecture, The MySQL Engine, MySQL Datatypes, MySQL Operators, MySQL Function,Accessing Database in PHP, Updating Database, Creating a new Database, Working with Data, Joins.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Design** simple web pages using HTML and perform client side validations using Javascript	PO1,PO3, PO5
CO2	**Develop** web Applications using server side Technologies like Servlet, JSP.	PO2,PO3, PO4,PO9
CO3	**Execute** programs in PHP, a widely used Server Side Scripting Languages	PO2,PO3, PO4,PO9, PO12
CO4	**Experiment** Object Oriented Programming Concepts such as Inheritance,Interface to solve real world problems using PHP.	PO1,PO2, PO3,PO9, PO11
CO5	**Devise** a Complete web Application by connecting it with MySQL.	PO1,PO2, PO4,PO11

TEXT BOOKS :

1. Programming World Wide Web , 7/e, 2002, Sebesta, Pearson, Singapore.

2. Beginning PHP and MySQL from Novice to Professionals, W.Jason GilMore, APress Berkeley, CA, USA.

REFERENCE BOOKS :

1. MySQL- The Complete Reference, Vikram Vaswani, Tata MCGraw Hill, 2004

2. Web Programming, building internet applications, 2/e, 2007, Chris Bates, Wiley, New Delhi.

3. The complete Reference Java,   7/e, 2008, Herbert Schildt, TATA Mcgraw- Hill, New Delhi

4. Java Server Pages, 3/e, 2008,   Hans Bergsten, SPD O'Reilly, New Delhi.An Introduction to Web

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	L	T	P	C
II MCA - I Semester	0	0	3	2

16MCA215   DATABASE MANAGEMENT SYSTEMS LAB

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.

Syllabus:

THE FOLLOWING TOPICS NEED TO BE COVERED IN THE LABORATORY SESSIONS

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

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14. NESTED QUERIES

15. CURSORS

16. PROCEDURES

17. TRIGGERS

Course Outcomes:

At the end of the course, students will be able to

	COURSE OUTCOMES	POs related to COs
CO1	**Demonstrate** defining and manipulating the structure of database and its data using basic SQL commands.	PO1
CO2	**Analyze the requirement to implement** a database schema for a given problem-domain.	PO2
CO3	**Enforce** Integrity Constraints on Database Schema using SQL Constraints to develop solutions for Data Constraints	PO3
CO4	**Experiment** the participant analysis in Database Environments towards an information oriented data processing using SQL Functions.	PO4
CO5	**Identify and Solve** Complex query processing using PL/SQL including stored procedures, stored functions, cursors and Triggers	PO5
CO6	**Following** ethical principles in implementing various Data Constraints and Database designs.	PO8
CO7	**Doing** experiments effectively as an individual and as a member in a group.	PO9
CO8	**Communicate** verbally and in written form, the understandings about the Integrity Constraints and Programs.	PO10
CO9	**Updating** their skill related to various database schema implementation for various applications during their life time	PO12

TEXT BOOKS :

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

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

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II MCA - I Semester   **L   T   P   C**

                                                          0   0   3   2

16MCA216   **WEB PROGRAMMING LAB**

PREREQUISITES: A course on "**Web Programming**".
Course Educational Objectives:

CEO1 To Design Static Web pages using HTML and Dynamic Web Page using PHP.

CEO2 To Learn a Scripting language called Java Script-used to do Client side Validation.

CEO3 To Learn XML & MySQL tool for Defining a database for Web Applications.

CEO4 To Explore Server Side Technologies like Servlets and JSP.

Hardware and Software required

1. A working computer system with either Windows or Linux

2. A web browser either IE or firefox

3. Tomcat web server and Apache web server

4. XML editor like Altova Xml-spy [www.Altova.com/**XML**Spy – free] , Stylusstudio , etc.,

5. A database either Mysql or Oracle

6. JVM(Java virtual machine) must be installed on your system

Syllabus:

Exercise : 1

Design the following static web pages required for an online book store web site.

1) HOME PAGE:

The static home page must contain three frames.

Top frame: Logo and the college name and links to Home page, Login page, Registration page,

Catalogue page and Cart page (the description of these pages will be given below).

Left frame : At least four links for navigation, which will display the catalogue of respective links.

For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

2) LOGIN PAGE

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart

CSE	
ECE	Login : [____]
EEE	Password: [____]
CIVIL	
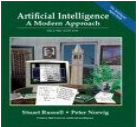
This page looks like below: [Submit]   [Reset]

3) CATOLOGUE PAGE

The catalogue page should contain the details of all the books available in the web site in a table. The details should contain the following:

Snap shot of Cover Page. , Author Name., Publisher.,   Price., Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	 XML Bible cover Artificial Intelligence A Modern Approach cover	Book : XML Bible Author : Winston Publication : Wiely Book : AI Author : S.Russel Publication : Princeton hall	$ 40.5 $ 63	Add to cart Add to cart

	Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
	Book : HTML in 24 hours Author : Sam Peter Publication : Sam publication	$ 50	Add to cart

Note: Week 2 contains the remaining pages and their description.

Exercise-2:

4) CART PAGE

The cart page contains the details about the books which are added to the cart.

The cart page should look like this:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE	Book name	Price	Quantity	Amount

ECE				
EEE	Java 2	$35.5	2	$70
CIVIL	XML bible	$40.5	1	$40.5
		Total amount -		$130.5

Exercise-3:

REGISTRATION PAGE

Create a "*registration form* "with the following fields

> 1)Name(Textfield)
>
> 2) Password (password field)
>
> 3) E-mail id (text field)
>
> 4) Phone number (text field)
>
> 5) Sex (radio button)
>
> 6) Date of birth (3 select boxes)
>
> 7) Languages known (check boxes – English, Telugu, Hindi, Tamil)
>
> 8) Address (text area)

VALIDATION

Write *JavaScript* to validate the following fields of the above registration page.

Name (Name should contains alphabets and the length should not be less than 6 characters).

Password (Password should not be less than 6 characters length).

E-mail id (should not contain any invalid and must follow the standard pattern

name@domain.com)

Phone number (Phone number should contain 10 digits only).

Note : validation of the login page can also be done with these parameters.

Exercise-4:

Design a web page using CSS (Cascading Style Sheets) which includes the following:

1) Use different font, styles:

In the style definition you define how each selector should work (font, color etc.).

Then, in the body of your pages, you refer to these selectors to activate the styles.

For example:

```
<HTML>
<HEAD>
<style                                    type="text/css">
B.headline   {color:red;   font-size:22px;   font-family:arial;   text-
decoration:underline}
</style>


</HEAD>


<BODY>
<b>This            is            normal            bold</b><br>
Selector                                        {cursor:value}


For                                                  example:


<html>
<head>
<style                                    type="text/css">
.xlink                                   {cursor:crosshair}
.hlink{cursor:help}
</style>
```

```
</head>


<body>
<b>
<a     href="mypage.htm"     class="xlink">CROSS     LINK</a>
<br>
<a      href="mypage.htm"      class="hlink">HELP      LINK</a>
</b>
</body>
</html>


<b     class="headline">This     is     headline     style     bold</b>
</BODY>


</HTML>
```

2) Set a background image for both the page and single elements on the page.
   You can define the background image for the page like this:

```
BODY {background-image:url(myimage.gif);}
```

3) Control the repetition of the image with the background-repeat property.

As background-repeat: repeat Tiles the image until the entire page is filled, just like an ordinary background image in plain HTML.

4) Define styles for links as

A:link

A:visited

A:active

A:hover

Example:

```
<style                                                    type="text/css">
A:link                 {text-decoration:                           none}
A:visited                {text-decoration:                         none}
A:active                {text-decoration:                          none}
A:hover        {text-decoration:        underline;        color:        red;}
</style>
```

5) Work with layers:

For example:

```
LAYER                1                ON                TOP:
<div style="position:relative; font-size:50px; z-index:2;">LAYER 1</div>
<div style="position:relative; top:-50; left:5; color:red; font-size:80px; z-
           index:1">LAYER                                    2</div>


LAYER                2                ON                TOP:
<div style="position:relative; font-size:50px; z-index:3;">LAYER 1</div>
<div style="position:relative; top:-50; left:5; color:red; font-size:80px; z-
           index:4">LAYER 2</div>
```

6) Add a customized cursor:

Selector   {cursor:value}

For example:

```
<html>
<head>
<style                                              type="text/css">
.xlink                                              {cursor:crosshair}
```

```
.hlink{cursor:help}
</style>
</head>


<body>
<b>
<a     href="mypage.htm"     class="xlink">CROSS     LINK</a>
<br>
<a      href="mypage.htm"      class="hlink">HELP     LINK</a>
</b>
</body>
</html>
```

Exercise-5:

Write an XML file which will display the Book information which includes the following:

1) Title of the book

2) Author Name

3) ISBN number

4) Publisher name

5) Edition

6) Price

Write a Document Type Definition (DTD) to validate the above XML file.

Display the XML file as follows.

Hint: You can use some xml editors like XML-spy

Exercise-6:

User Authentication

Assume four users user1,user2,user3 and user4 having the passwords pwd1,pwd2,pwd3 and pwd4 respectively. Write a servelet for doing the following.

1. Create a Cookie and add these four user id's and passwords to this Cookie.

2. Read the user id and passwords entered in the Login form (week1)   and authenticate with the values (user id and passwords) available in the cookies.

If he is a valid user(i.e., user-name and password match) you should welcome him by name(user-name) else you should display " You are not an authenticated user ".

Use init-parameters to do this. Store the user-names and passwords in the webinf.xml and access them in the servlet by using the getInitParameters() method.

Exercise-7:

Install a database(Mysql or Oracle).

Create a table which should contain at least the following fields: name, password, email-id, phone number(these should hold the data from the registration form).

Practice 'JDBC' connectivity.

Write a java program/servlet/JSP to connect to that database and extract data from the tables and display them. Experiment with various SQL queries.

Insert the details of the users who register with the web site, whenever a new user clicks the submit button in the registration page (week2).

Exercise-8:

Write a JSP which does the following job:

Create tables in the database which contain the details of items (books in our case like Book name , Price, Quantity, Amount)) of each category. Modify your catalogue page (week 2)in such a way that you should connect to the database and extract data from the tables and display them in the catalogue page.

IMPLEMENT THE FOLLOWING USING PHP & MySQL

Exercise-9:

i.   Simple Arithmetic, Logical and Relation operation

ii.   Arrays

Exercise-10:

i.   String Handling

Exercise-11:

i.   Exception handling

ii.   Functions , Date & Time

Exercise-12:

i.   File Operations

Exercise-13:

i.   Various DDL, DML operations in MySQL

Exercise-14:

i.   Join Operations in MySQL.

ii.   Connection Establishment Between PHP and MySql Database.

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		POs related to COs
CO1	**Demonstrate** Knowledge on HTML, Javascript, Servlet, JSP and PHP to develop an web applications	PO1
CO2	**Analyze** the Real World problems to be solved by technologies like 7Servlet, JSP and PHP	PO2
CO3	**Design** and **Develop** solutions for web applications.	PO3
CO4	Manually Test the functionality of the web application	PO4

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CO5	**Select** appropriate design tools and procedure to **implement** web applications	PO5
CO6	**Follow** ethical principles in designing, and **implementing** various Technologies.	PO8
CO7	Do e**xperiments** effectively as an individual and as a member in a group.	PO9
CO8	**Communicate** verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue **updating** their skill related to various web technologies like servlet, JSP,PHP for **implementing** various web applications during their life time	PO12

MCA DEPARTMENT

III MCA - I Semester	L	T	P	C
	0	0	3	2

16MCA217   **UNIX LAB**

PREREQUISITES: A course on "**Operating System**".
Course Educational Objectives:

CEO1 To Practice Basic Unix Commands for Files and Directories.

CEO2 To Practice Vi editor and to know about awk .

CEO3 To Explore Basic Shell Script Programs.

Syllabus:

Practice the Following commands in UNIX

1. Entering commands.

2. Common Commands for Files and Directories

3. Searching Files

4. More about Listing Files

5. Permission Commands

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)

18. awk Utilities.

19. Write a Shell Script that copies multiple files to a directory.

20. Write a Shell Script (small calculator) that adds, subtracts, multiplies and divides the given two integers. There are two division options: one returns the quotient and the other returns reminder. The Script requires 3 arguments : The operation to be used and two integer numbers. The options are add(-a), subtract(-s), multiply(-m), quotient(-c) and reminder (-r).

21. Write a Shell Script that counts the number of lines and words present in a given file.

22. Write a Shell Script that displays the list of all files in the given directory.

23. Write a Shell Script to generate a Multiplication Table.

24. Write a Shell Script to reverse the rows and columns of a matrix.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		POs related to COs
CO1	**Demonstrate** the knowledge on Object Oriented Analysis and Design	PO1
CO2	**Analyze** various complex models and draw UML diagrams.	PO2
CO3	**Design and develop** models for real time systems using UML diagrams.	PO3
CO4	**Conduct investigation** on each real time entities and find the solutions for designing new models.	PO4
CO5	Select appropriate design tools and procedure to **simulate** real time systems.	PO5
CO6	**Follow** ethical principles in designing, **simulating** and implementing various system models.	PO8
CO7	Do **experiments** effectively as an individual and as a member in a group.	PO9
CO8	**Communicate** verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue **updating** the skill related to Object Oriented Analysis and Design for various applications during their life time	PO12

SREENIVASA INSTITUTE OF TECHNOLOGY AND MANAGEMENT STUDIES
(AUTONOMOUS)

<u>**MCA DEPARTMENT**</u>

II MCA - II Semester	**L**	**T**	**P**	**C**
	3	**1**	**0**	**4**

16MCA221   DATA WAREHOUSING & DATA MINING

PREREQUISITES: A Course on "Data Base Management System"

Course Educational Objectives:

CEO1 To understand and implement classical models and algorithms in data warehousing and data mining.

CEO2 To make the student acquaint with the tools and techniques used for KDD, and other data repositories and evaluate different models used for OLAP and data pre-processing.

CEO3 To Categorize and carefully differentiate between situations for applying different data mining techniques: mining frequent pattern, association, correlation, classification, prediction, and cluster analysis.

CEO4 To design and implement systems for data mining, evaluate the performance of different data mining algorithms.

CEO5 To assess the strengths and weaknesses of various methods and algorithms and to analyze their behavior.

Syllabus:

UNIT - 1 :   Introduction and Data Pre-Processing

Motivation and Importance- What is Data Mining- Data Mining on What Kind of data Data Mining Functionalities-Classification of Data Mining Systems- Data Mining Task Primitives Major Issues in Data Mining.

Why Preprocess the data-Data Cleaning-Data Integration- Data Transformation- Data Reduction.

UNIT - 2 :   Data Warehouse and OLAP Technology

What is a Data Warehouse-Multi dimensional data model- schemas for multi dimensional database- OLAP operations in the Multi dimensional data model-Data Warehouse Architecture-Data Warehouse Implementation-From Data Warehousing to Data Mining.

UNIT - 3 :   Mining Frequent Patterns , Associations and Correlations

Basic Concepts and a Road Map, Efficient and Scalable Frequent Itemset Mining Methods, The Apriori Algorithm: Finding Frequent Itemsets Using Candidate Generation, Generating

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Association Rules from Frequent Itemsets, Mining Frequent Itemset without Candidate Generation, Mining various Kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT - 4 :   Classification & Prediction

What is Classification, What is Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation , Support Vector Machines, Lazy Learners, Prediction, Linear Regression and non- Linear Regression , Accuracy and Error Measures.

UNIT - 5 :   Cluster Analysis, Advanced Techniques and Applications

What is Cluster Analysis, Types of Data in Cluster Analysis, Partitioning Methods, K-Means Method, Hierarchical Methods, Agglomerative &Devise Hierarchical Clustering, Density Based Methods, DBSCAN: A Density – Based Clustering Method Based on Connected Regions with sufficiently High Density, Grid-Based Methods, STING: Statistical Information Grid, Mining Time- Series Data, Spatial Data Mining, Multimedia Data Mining, Text Mining, Data Mining Applications.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Identifying** data mining tools **analyze** various dataming algorithms to solve the realtime problems.	PO1,PO2,PO3, PO4,PO5
CO2	**Using** multi dimensional data model design a data warehouse and **Apply** the OLAP technology to solve decision making problems.	PO1,PO2,PO3, PO4,PO5,
CO3	**Apply** the minig techniques like frequent patterns, association rules on transactional databases.	PO1,PO2,PO3, PO4,PO5
CO4	**Apply** different Classification models to solve the classification problems.	PO1,PO2,PO3, PO4,PO5,PO11, PO12
CO5	**Apply**ing different clustering Algorithms to find clusters of the given dataset and **explore** recent trends in data mining such as text mining ,spatial data mining, multimedia data mining.	PO1,PO2,PO3, PO4,PO5,PO11, PO12

TEXT BOOKS :

1. Data Mining: Concepts and Techniques, 2/e, 2009, Jiawei Han and Micheline Kamber, Morgan Kaufmann Publishers, New Delhi, India.

2. Introduction to Data Mining, 2006, Pang - Ning Tan, Micael Steinbach and Vipin Kumar, Pearson education, New Delhi, India.

REFERENCE BOOKS :

1. Data Mining: Introductory and Advanced topics, 2008, Margaret H. Dunham, Pearson Education, New Delhi, India.

2. Building the Data Warehouse, 4/e, 2008, W.H.Inmon , Wiley-India, Fourth Edition, New Delhi, India.

3. Insight into Data Mining Theory and Practice, 2010, K.P. Soman, Shyam Diwaker, V. Ajay, PHI Learning Private Limited, New Delhi, India.

4. Data Mining Techniques, 2007, Arun K. Pujari, Tata Mc- Graw Hill, New Delhi, India.

5. Data Mining A tutorial Based Primer, 2003, Richard J. Roiger and Michael W. Geatz, Pearson Education, Singapore.

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II MCA - II Semester

L	T	P	C
4	0	0	4

16MCA222   OBJECT ORIENTED ANALYSIS & DESIGN (USING UML)

PREREQUISITES: A Course on "Software Engineering"

Course Educational Objectives:

CEO1   To explore the Basic Building Blocks of UML

CEO2   To Learn about Structural Modeling Diagrams

CEO3   To Learn about Behavioral Modeling Diagrams

CEO4   To Learn Architectural Modeling Diagrams

CEO5   To Analysis and Design Library management system using UML

Syllabus:

UNIT - 1 :   Introduction to UML

Importance of modeling- principles of modeling- object oriented modeling- conceptual model of the UML- Architecture- Software Development Life Cycle.Basic Structural Modeling: Classes- Relationships- common Mechanisms- and diagrams.Advanced Structural Modeling:Advanced classes- advanced relationships- Interfaces- Types and Roles- Packages.

UNIT - 2 :   Class & Object Diagrams

Terms and concepts- common modeling techniques for Class & Object Diagrams-Interactions- Interaction diagrams.

UNIT - 3 :   Basic Behavioral Modeling

Use cases- Use case Diagrams- Activity Diagrams.Advanced Behavioral Modeling- state machines- processes and Threads- Time and space- statechart diagrams.

UNIT - 4 :   Architectural Modeling

Components- Deployment- Component diagrams and Deployment diagrams.

UNIT - 5 :   A process for using UML,Case Study-Automation of Library Management System.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Understand** the importance and key principles of modeling, Learn Conceptual model of UML	PO1,PO2, PO3,PO4, PO11
CO2	**Familiarize** with the application of the Unified Modeling Language towards analysis and design using Class and Object Diagrams	PO1,PO2, PO3
CO3	**Master** with the basic and Advanced behavioral modeling.	PO1,PO2, PO3,PO4
CO4	**Develop** an Architectural model using component and deployment diagrams and can Learn Reverse and Forward engineering.	PO1,PO2, PO3
CO5	**Draw**various UML diagrams for Library Management System and draw for any real time system.	PO1,PO2, PO3,PO4, PO5,PO11

TEXT BOOKS :

1. The Unified Modeling Language User Guide, 2/e, 2005, Grady Booch, James Rumbaugh and Ivar Jacobson, Pearson Education, New Delhi, India.

2. UML 2 Toolkit, 1/e, 2003, Hans,Erik Eriksson, Magnus Penker , Brian Lyons and David Fado, WILEY Dreamtech India Pvt. Ltd., India.

REFERENCE BOOKS:

1. Fundamentals of Object Oriented Design in UML, 1/e, 1999, Meilir Page, Jones, Pearson Education, India.

2. Modelling Software Systems Using UML2, 1/e, 2010, Pascal Roques, WILEY Dreamtech India Pvt. Ltd.

3. Object Oriented Analysis & Design, 1/e, 2004, Atul Kahate, The McGrawHill Companies, Hyderabad, India.

4. Practical Object Oriented Design with UML, 2/e, 2005, Mark Priestley, TATA McGraw Hill, Hyderabad, India.

5. Object-Oriented Analysis and Design with Applications, 3/e, 2007, Grady Booch, Robert A. Maksimchuk, Michael W. Engle, Bobbi J. Young, Jim Conallen, Kelli A. Houston, Pearson Education, India.

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II MCA - II Sem	L	T	P	C
	4	0	0	4

16MCA223   CLOUD INFRASTRUCTURE AND SERVICES

PREREQUISITES: A Course on "Computer Networks".

Course Educational Objectives:

CEO1   To explore the Basics of Cloud Computing.

CEO2   To Learn how to Build Cloud Networks.

CEO3   To Explore Federation presence, Identity, privacy in the cloud-security.

CEO4   To Learn Common Standards in Cloud Computing.

CEO5   To Explore Cloud Service Providers.

Syllabus:

UNIT - 1 :   Cloud Computing Basics

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 - 2 :   Building Cloud Networks - Virtualization Practicum

The evolution from the MSP Model to cloud computing and software-as-a-service, The cloud Data Center, Service-Oriented Architecture as a step toward Cloud computing, Basic approach to a Data center-based SOA. Downloading sun xVM virtualBox, Installing Sun xVM VirtualBox, Adding a Guest Operating System to VirtualBox.

UNIT - 3 :   Federation Presence, Identity and Privacy in the cloud-Security in the cloud

Federation in the cloud, Presence in the cloud, Privacy and its relation to cloud based information system, Security in the Cloud, Cloud security challenges, Software-as-a-service security

UNIT - 4 :   Common Standards in Cloud Computing - End user access to cloud computing

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 - 5 :   Cloud Computing with the Titans

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

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Articulate** the main concepts, key technologies, strengths, and limitations of cloud computing	PO1,PO3,PO6
CO2	**Conceptualize** and **Apply** suitable virtualization concept and Cloud Resource Management	PO1,PO3, PO5,PO6
CO3	**Assess** the core issues of cloud computing such as security, privacy, and interoperability.	PO1,PO2,PO3, PO5,PO6,PO8
CO4	**Understand** the standards for security, messaging and applications, and also end user accessibility to cloud.	PO1,PO6,PO7
CO5	**Aware** the various services provided by big titans of cloud computing	PO1,PO3,PO5

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.

5. "Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and More", 1/e, 2013, Kris Jamsa , Jones & Bartlett Learning, Massachusetts, US.

MCA DEPARTMENT

II MCA - II Semester   **L   T   P   C**

                                                             4   0   0   4

16MCA224A   SOFTWARE PROJECT MANAGEMENT

(Elective – I)

PREREQUISITES: A Course on "**Software Engineering**".

Course Educational Objectives:

CEO1 The student should be made to understand the overview of software project management, project planning and Step Wise framework in project planning.

CEO2 The students should be made to learn about how to assess the projects and to find the cost of the project using cost benefit evaluation techniques and to evaluate the risks involved in the project.

CEO3 The student should be made to understand the activity plan for a project and to estimate the overall duration of the project by analyzing the risks involved in it.

CEO4 The student should be made to learn how to monitor the progress of projects and to assess the risk of slippage so that project's requirements can be controlled.

Syllabus:

UNIT - 1 :   Conventional Software Management

The waterfall model, conventional software Management performance. Evolution of Software Economics : Software Economics, pragmatic software cost estimation.

Improving Software Economics :   Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.

UNIT -2 :   The old way and the new

The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process.

Life cycle phases : Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process :   The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts.

UNIT - 3 :   Model based software architectures

A Management perspective and technical perspective. Work Flows of the process : Software process workflows, Iteration workflows.

Checkpoints of the process : Major mile stones, Minor Milestones, Periodic status assessments.Iterative Process Planning : Work breakdown structures, planning guidelines, cost and schedule,estimating, Iteration planning process, Pragmatic planning.

Project Organizations and Responsibilities : Line-of-Business Organizations, Project Organizations, evolution of Organizations.

UNIT - 4 :   Process Automation

Automation Building blocks, The Project Environment.

Project Control and Process instrumentation : The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation.

Tailoring the Process : Process discriminants.

UNIT - 5 :   Future Software Project Management

Modern Project Profiles, Next generation Software economics, modern process transitions.

Case Study: The COCOMO Cost Estimation Model.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Understand the basics of project culture, training the people and choosing tools for** effective project management.	PO1,PO2, PO3,PO5
CO2	**Learn and Apply** principles of conventional software engineering and modern software management.	PO1,PO2, PO3,PO4, PO5, PO11
CO3	**Conceptualize** the software process workflow and Architecture. Identify major mile stones and do periodic status assessments.	PO1,PO2, PO3,PO4, PO5, PO11
CO4	**Monitor** the progress of projects in work breakdown structures and to **assess** iterative process planning, and also cost and schedule estimation.	PO1,PO2, PO3,PO4, PO5,PO11
CO5	**Identify** the management indicators and Quality indicators that influence modern project profiles and next generation software economies.	PO1,PO2, PO4,PO5, PO11

TEXT BOOK :

1. Software Project Management, Walker Royce: Pearson Education, 2005.

REFERENCES :

1. Software Project Management, Bob Hughes and Mike Cotterell: Tata McGraw-Hill Edition.

2. Software Project Management, Joel Henry, Pearson Education.

3. Software Project Management in practice, Pankaj Jalote, Pearson Education.2005.

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II MCA - II Semester	L	T	P	C
	4	0	0	4

16MCA224B   **. NET TECHNOLOGIES**

(Elective – I)

PREREQUISITES: A course on "Web Programming" and Basic Programming Skills.
Course Educational Objectives:

Course Educational Objectives:

CEO1   To explore the knowledge on different types of applications of .net.

CEO2   To know about the design methodologies with concentration on object oriented concepts.

CEO3   Giving the students a complete knowledge on .net framework and .net environment.

CEO4   To provide the knowledge on developing internet applications and how to design and implement complete applications over the web.

CEO5   To acquire basic knowledge of developing client server applications and to provide basic knowledge on web services.

CEO6   Giving the students a quick review on web servers, client side programming, server side programming and various web technologies.

Syllabus:

UNIT - 1 :   Introduction to C# and .NET Framework

Introducing C# - Evolution of C# , Characteristics of C# , Applications of C#, How does C# differs from C++ & Java.

The Origin of .NET Technology, The .NET Framework, The Common Language Runtime, Framework Base Classes, User & Program interfaces, Visual Studio .NET, .NET languages , Benefits of .NET approach , C# and the .NET

Overview of C# - Literals, Variables and Data Types – Operators and Expressions.

UNIT - 2 :   Programming with C#

Decision Making and Branching – Decision Making and Looping – Methods in C# - Handling Arrays – Manipulating Strings.

Structures and Enumerations - Introduction , Structures , Enumerations.

Classes and Objects – Inheritance and Polymorphism , Multilevel Inheritance , Hierarchical Inheritance , Overriding Methods , Abstract Classes , Abstract Methods , Polymorphism .

Interfaces – Delegates and Events – Multithreading in C#.

UNIT - 3 :   Introduction to Visual Basic.NET

What is VB.NET – Hello World – Variables – Constants and Operators – Modulariing your code – Functions and Subroutines – Controlling Program Flow – Handling Errors and Exceptions – Object Oriented Programming – Multithreaded Programming.

UNIT - 4 :   Working with ASP.NET

Features of ASP.NET – The Anatomy of ASP.NET Pages – Introducing Web Forms – VS.NET Web Application and Other IDE Basics – Separating Content and Code – the Code Behind Features – Application Configuration – Using HTML Controls – Using Web Controls – Web Controls for Displaying and Formatting Data – Web Controls for Creating Buttons – Web Controls for Inputting Text – Web Controls for Selecting Choices – Web Controls for Creating Lists – Creating a Simple ASP.NET Application – ASP.NET Page Directives – Validation Controls – Data List Controls – User Controls.

UNIT - 5 :   Introduction to Web Services and ADO.NET

The Need for Web Services, Overview of Web Services – Web Service Description Language – Web Service Wire Formats – Web Services – Discovery – Creating a Simple Web Service

Overview of Data Access on the Web – ADO.NET Programming Objects and Architecture – Displaying Database Data – Programming with the DataList and DataGrid Controls – Working with the DataSet and DataTable Objects.

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Acquire** the knowledge on the basics of .net framework and .net environment.	PO1,PO3
CO2	**Experiment** Programming and Object Oriented Programming Concepts in C#.NET.	PO1,PO2
CO3	**Explore** web applications using various web technologies like ASP.NET, HTML and CSS.	PO1,PO5
CO4	**Elicit** the basic terminology to develop web applications using	PO1,PO5

	.ASP.NET.	
CO5	**Proficiency** in Web Services and ADO.NET application development environments.	PO1,PO4

TEXT BOOKS :

1. Programming in C#, 2/e, 2008, E. Balagurusamy, Tata McGraw – Hill Publishing
2. Company Limited, New Delhi.
3. ASP.NET and VB.NET Web Programming, 2002, Matt J. Crouch, Pearson Education, New Delhi.

REFERENCE BOOKS :

1. Programming Microsoft® Visual Basic® .NET (Core Reference), 2006, Francesco Balena, Microsoft Press, New Delhi..
2. Microsoft® ADO.NET Step by Step,2002, Rebecca M. Riordan, Microsoft Press, New Delhi.
3. Professional ASP.NET 2.0 XML, 2006, Thiru Thangarathinam ,Wiley Publishing.
4. Building Microsoft® ASP.NET Applications for Mobile Devices, 2/e, 2003, Andy Wigley, Peter Roxburgh , Microsoft Press.
5. 5..NET Framework Essentials, 3/e, 2003, Thuan L. Thai, Hoang Lam, O'Reilly & Associates, United States of America.

MCA DEPARTMENT

II MCA - II Semester	L	T	P	C
	4	0	0	4

16MCA224C   **EMBEDDED SYSTEMS**

(Elective – I)

PREREQUISITES: A course on "Computer Networks"
Course Objectives:

- To have basic knowledge of embedded systems.

- To understand the RTOS concepts

- To describe the Hardware and Software architecture of any Embedded System

- Understand the various Kernel objects of Embedded operating system.

- Understand the basics of Embedded operating system and availability of Various Embedded operating system in the market

Syllabus:

UNIT - 1 :   **Introduction to Embedded Systems**

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History of Embedded Systems, Classification, Major Application Areas, Purpose of Embedded Systems,

Characteristics and Quality Attributes of Embedded Systems.

UNIT - 2 :   **Typical Embedded System**

Core of the Embedded System: General Purpose and Domain Specific Processors, ASICs, PLDs, Commercial Off-The-Shelf Components (COTS), Memory: ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

UNIT - 3 :   **Embedded Firmware, Design and Development**

Embedded Firmware: Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock, Watchdog Timer, Embedded Firmware Design Approaches and Development Languages.

UNIT - 4 :   RTOS Based Embedded System Design

Operating System Basics, Types of Operating Systems, Tasks, Process and Threads, Multiprocessing and Multitasking, Task Scheduling.

UNIT - 5 :   Task Communication

Shared Memory, Message Passing, Remote Procedure Call and Sockets, Task Synchronization: Task Communication/Synchronization Issues, Task Synchronization Techniques, Device Drivers, How to Choose an RTOS.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Demonstrate** basic introduction about Embedded system	PO1,PO2,PO3
CO2	**Demonstrate** various component requirements for constructing Embedded system	PO1,PO2,PO3,PO4, PO8,PO10
CO3	**Analyze** design and development firmware of Embedded system	PO1,PO2,PO3,PO4, PO8,PO10, PO12
CO4	**Analyze** RTOs of Embedded system	PO1,PO2,PO3,PO4, PO8,PO10,PO12
CO5	**Analyze** various techniques for communication methods in Embedded system	PO2,PO3,PO4, PO8,PO10,PO12

TEXT BOOKS:

1. Introduction to Embedded Systems -Shibu K.V, Tata McGraw Hill Publication.

REFERENCE BOOKS:

1. Embedded Systems, Raj Kamal, TMH.
2. Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
3. Embedded Systems, Lyla, Pearson, 2013
4. An Embedded Software Primer, David E. Simon, Pearson Education

II MCA - II Semester	L	T	P	C
	4	0	0	4

16MCA225A   **WEB SERVICES**

(Elective – II)

PREREQUISITES: Courses on "Computer Networks".

Course Educational Objectives:

COE1: To provide fundamental concepts of Web Service Architecture.

COE2: To gain knowledge about SOAP, WSDL, UDDI and XML to create web services.

Syllabus:

UNIT - 1 :   Introduction to Web Services

The definition of web services - basic operational model of web services - tools and technologies enabling web services - benefits and challenges of using web services

UNIT - 2 :   Web Services Architecture

Web services Architecture and its characteristics - core building blocks of web services - standards and technologies available for implementing web services - web services communication - basic steps of implementing web services - developing web services enabled applications.

UNIT - 3 :   Core fundamentals of SOAP

SOAP Message Structure - SOAP encoding -, SOAP message exchange models - SOAP communication and messaging - SOAP security. Developing Web Services using SOAP – Building SOAP Web Services - developing SOAP Web Services using Java - limitations of SOAP.

UNIT - 4 :   Describing Web Services

WSDL – WSDL in the world of Web Services - Web Services life cycle - anatomy of WSDL definition document - WSDL bindings - WSDL Tools – Features of WSDL - limitations of WSDL. Discovering Web Services – Service discovery - role of service discovery in a SOA - service discovery mechanisms - UDDI – UDDI Registries - uses of UDDI Registry.

UNIT - 5 :   Approaches of UDDI

Programming with UDDI -UDDI data structures - support for categorization in UDDI Registries - Publishing API - Publishing information to a UDDI Registry - searching information in a UDDI Registry - deleting information in a UDDI Registry - limitations of

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UDDI. Web Services Interoperability – Means of ensuring Interoperability. Web Services Security – XML security frame work - XML encryption - XML digital signature - XKMS structure - guidelines for signing XML documents.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Demonstrate** basic operations ,tolls and technologies of web services	PO1,PO2
CO2	**Illustrate** the web services architecture implemental method	PO1,PO2, PO3
CO3	**Examine** the core fundamentals of SOAP of software provider	PO1,PO2,PO3 PO8,PO10
CO4	**Examine** the description of web services using WS**	PO1,PO2, PO3,PO8,PO10
CO5	**Examine** the mechanism for service broker implementation	PO1,PO2, PO3, PO8,PO10

TEXT BOOKS :

1. Developing Java Web Services, 2008, R. Nagappan, R. Skoczylas, R.P. Sriganesh, Wiley India.

2. Developing Enterprise Web Services, 2008, S. Chatterjee, J. Webber, Pearson Education.

REFERENCE BOOKS :

1. Building Web Services with Java, 2/e, 2008, S. Graham and others, Pearson Education.

2. Java Web Services Architecture, 2005, McGovern, et al., Morgan Kaufmann Publishers.

3. Web Services, 2005, G. Alonso, F. Casati and others, Springer.

4. XML, Web Services and the Data Revolution, F.P.Coyle, Pearson Education.

5. Java Web Services, D.A. Chappell & T. Jewell, O'Reilly,SPD.

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II MCA - II Semester	L	T	P	C
	4	0	0	4

16MCA225B   **INFORMATION SECURITY**

(Elective – II)

PREREQUISITES: A course on " Computer Networks"
Course Educational Objectives:

CEO1: Understand Security threats, vulnerabilities and attacks and enlist them for any networked application.

CEO2: Apply detective and preventive counter measures in different scenarios after evaluating Symmetric and asymmetric encryption methods to achieve confidentiality.

CEO3: Analyze the use of Authentication applications, Web, IP and Email security

CEO4: Evaluate the need of Intrusion Detection and Firewalls

Syllabus:

UNIT -1 :   Introduction and Symmetric Encryption

Security Trends, the OSI Security Architecture, Security Attacks, Security Services Security Mechanisms, A Model for Network Security, Symmetric Cipher Model, Substitution Techniques, Transposition Techniques, Steganography.

UNIT - 2 :   Symmetric Ciphers

Block Cipher principles, the Data Encryption Standard, the strength of DES, Differential and Linear Cryptanalysis, Block cipher Design principles.

Finite Fields: Groups, Rings and Fields- Modular Arithmetic - the Euclidean Algorithm-

Finite Fields of the Form GF(p)

Advanced Encryption Standard: Evaluation Criteria for AES- the AES cipher, More on Symmetric Ciphers- triple DES, Block cipher modes of operation, Stream Ciphers.

UNIT - 3 :   Public Key Encryption and Hash Functions

Prime Numbers, Principles of Public-key Cryptosystems, RSA, Key Management, Diffie-Hellman Key Exchange, Authentication Requirements, Functions, Message authentication codes, Hash Functions, Secure hash algorithm, HMAC, Digital signatures, Authentication Protocols.

Authentication Applications: Kerberos, X.509Authentication Service.

UNIT - 4 :   Electronic Mail Security and IP Security

Pretty Good Privacy, S/MIME, IP Security Overview, IP Security Architecture, Authentication header, Encapsulating Security Payload, Combining Security Associations, Key Management.

UNIT - 5 :   Web Security and Intruders, Firewalls

Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS),

Intruders, Intrusion Detection, Password Management, the Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewall Basing, Firewall Location and Configurations

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Understand** the model of a network security and symmetric encryption techniques	PO1,PO3, PO4
CO2	**Design and analysis** of symmetric ciphers using different symmetric algorithms	PO1,PO2, PO3,PO4
CO3	**Design and analysis** of public key encryption, apply authentication applications using hash functions	PO1,PO2, PO3,PO4
CO4	**Implementing** electronic mail and IP security using different protocols	PO1,PO2, PO3
CO5	**Understand** the concepts of intruders and applying different types of firewall techniques.	PO1,PO2, PO3

TEXT BOOKS:

1. Cryptography and Network Security, 4/e, 2006, William Stallings, Pearson Education, New Delhi.

2. William Stallings, "Network Security Essentials: Applications and Standards", 4th Edition,

3. Pearson Education.

REFERENCE BOOKS:

1. Principles and Practices of Information Security, 4/e, 2012, Michal E. Whitman and Herbert J. Mattord, Cengage Learning, New Delhi.

2. Fundamentals of Network Security, 1/e, 2008, Eric Maiwald (Dreamtech press),New Delhi.

3. Network Security - Private Communication in a Public World, 2/e, 2002, Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.New Delhi.

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II MCA - II Semester	L	T	P	C
	3	1	0	4

16MCA225C   ARTIFICIAL INTELLIGENCE

(Elective – II)

PREREQUISITES: A course on "Data Warehousing and Data Mining".
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 for 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.

Syllabus:

UNIT - 1 :   Introduction

Introduction: What is AI? - The History of Artificial Intelligence - The State of the Art

Intelligent Agents: Agents& Environments   - Structure of Agents.

Solving Problems by Searching: Problem Solving Agents – Example Problems- Searching for Solutions

UNIT - 2 :   Search Strategies

Uninformed Search Strategies -Avoiding Repeated States. Informed Search and Exploration: Informed (Heuristic) Search Strategies - Heuristic Functions - Local Search Algorithms and Optimization Problems - Local Search in Continuous Spaces – Defining Constraint Satisfaction Problems- Constraint Propagation: Inference in CSPs.

UNIT - 3 :   Knowledge and Reasoning

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 - 4 :   First Order Logic & Knowledge Representation

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

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

UNIT - 5 :   Uncertain Knowledge, Reasoning and Learning

Quantifying Uncertainty: Acting Under Uncertainty - Basic Probability Notation - Inference Using Full Joint Distributions – Independence - Bayes' Rule and Its Use.

Learning from Examples: Forms of Learning - Supervised Learning - Learning Decision Trees – Artificial Neural Networks- Support Vector Machines - Ensemble Learning-Practical Machine Learning.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Explain** the key characteristics and structure of intelligent agents	PO1,PO2
CO2	**Solve** search problems by applying a suitable search strategy.	PO1,PO2,PO3, PO4,PO8,PO12
CO3	**Design** of an intelligent agent using propositional logic and first order logic to solve reasoning problems	PO1,PO2, PO3,,PO4,PO5 PO12
CO4	**Construct** a knowledge representation system using logic and ontological engineering to facilitate inference in the given problem domain	PO1,PO2, PO3,,PO4,PO5 ,PO11,PO12
CO5	**Construct** a knowledge base for uncertain knowledge inference using probability distribution and solving problems using different machine learning techniques	PO1,PO2, PO3,,PO4,PO5, PO6,PO12

TEXT BOOKS:

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

REFERENCES:

1. Artificial Intelligence, Third Edition, Elaine Rich, Kevin Knight and Shiva shankar B Nair Tata McGraw Hill.

2. Artificial Intelligence-Structures and Strategies for Complex Problem Solving, Fifth Edition, George F. Luther, Pearson Education.

3. Introduction to Artificial Intelligence, Eugene Charniak and Drew McDermott, Pearson   Education.

II MCA - II Semester

L	T	P	C
0	0	3	2

16MCA226   DATA WAREHOUSING AND DATA MINING LAB

PREREQUISITES: A Course on "Data Warehousing and Data Mining"

Course Educational Objectives:

CEO1 Be familiar with the algorithms of data mining.

CEO2 Be acquainted with the tools and techniques used for Knowledge Discovery in Databases.

CEO3 Be exposed to web mining and text mining.

LIST OF EXPERIMENTS

1. Creation of a Data Warehouse.

2. Apriori Algorithm.

3. FP - Growth Algorithm.

4. K - means clustering.

5. One Hierarchical clustering algorithm.

6. Bayesian Classification.

7. Decision Tree.

8. Support Vector Machines.

9. Applications of classification for web mining.

10. Case Study on Text Mining or any commercial application

SOFTWARE: WEKA, RapidMiner, DB Miner or Equivalent

Course Outcomes:

Upon completion of this course, the students will be able to:

COURSE OUTCOMES		
CO1	**Demonstrate** knowledge on Design of Data cube and solving Data Mining Tasks using Mining Frequent Patterns, Classification Models and Clustering Algorithms .	PO1
CO2	**Apply** multi dimensional data model to **design** a data cube for a	P02

	Central theme and The OLAP Operations like Roll-Up, Drill-Down, slice, Dice, Pivot on a Data cube using R-Tool.	
CO3	**Apply** Data Cleaning and Data Normalization to fill the missing values and to Normalize the values.	PO3
CO4	**Analyze** the given data set to determine Frequent Patterns and Association rules by **Apply**ing Frequent pattern Mining and Association Rule Mining Algorithms.	PO4
CO5	**Create** a dataset , Select and Apply a Decision Tree Algorithm to **Construct** a Decision Tree model and **Apply** it to predict the class label of data tuples whose class label is unknown and also **Apply** Bayesian Classification model to solve classification problems using any modern tool.	PO5
CO6	**Develop** a program for Support Vector Machines using a R Tool to solve classification problems and **Apply**ing different clustering Algorithms to find clusters of the given data set and determining Outlier data objects. .	PO5
CO7	Follow ethical principles in **Analyz**ing, **designi**ng and **implement**ing various Data Analysis Tasks.	PO8
CO8	Do **experiments** effectively as an individual and as a member in a group and **Communicate** verbally and in written form, the understandings about the experiments	P09, PO10
CO9	**Continue** updating their skill related to Data Mining Tasks implementation for various application during their life time	PO12

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II MCA - II Semester	L	T	P	C
	0	0	3	2

16MCA227   OBJECT ORIENTED ANALYSIS & DESIGN LAB

PREREQUISITES: A Course on "Object Oriented Analysis & Design"

Course Educational Objectives:

CEO1: To Explore the Conceptual Model of UML

CEO2: To Model Static parts of the System using UML

CEO3: To Model Dynamic parts of the System using UML

CEO4: To Learn Reverse and Forward Engineering

Syllabus:

1) **Write about Conceptual Model of UML**

2) **Draw the Following UML Diagrams for Library Management System**

- Use Case Diagram.

- Class Diagram.

- Sequence Diagram.

- Collaboration Diagram.

- State Chart Diagram

- Activity Diagram.

- Component Diagram

- Deployment Diagram.

3) **Draw the Following UML Diagrams for Airline Reservation System**

- Use Case Diagram.

- Class Diagram.

- Sequence Diagram.

- Collaboration Diagram.

- State Chart Diagram

- Activity Diagram.

- Component Diagram

- Deployment Diagram.

4) **Draw the Following UML Diagrams for Hospital Management System**

- Use Case Diagram.

- Class Diagram.

- Sequence Diagram.

- Collaboration Diagram.

- State Chart Diagram

- Activity Diagram.

- Component Diagram

- Deployment Diagram.

5) Illustrate Forward and Reverse Engineering concept

6) Implement All UML Diagrams by taking your own Systems(Minimum 2 Systems)

Course Outcomes:

Upon completion of this course, the students will be able to:

Course Outcomes		POs related to COs
CO1	**Demonstrate** the knowledge on Object Oriented Analysis and Design	PO1
CO2	**Analyze** various complex models and draw UML diagrams.	PO2
CO3	**Design and develop** models for real time systems using UML diagrams.	PO3
CO4	**Conduct investigation** on each real time entities and find the solutions for designing new models.	PO4
CO5	Select appropriate design tools and procedure **to simulate** real time systems.	PO5
CO6	Follow ethical principles in **designing, simulating and implementing** various system models.	PO8
CO7	Do **experiments** effectively as an individual and as a member in a group.	PO9
CO8	**Communicate** verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue **updating** the skill related to Object Oriented Analysis and **Design** for various applications during their life time	PO12

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II MCA - II Semester	**L**	**T**	**P**	**C**
	0	**0**	**3**	**2**

16MCA228   REASONING, APTITUDE AND TECHNICAL LAB

PREREQUISITES: Graduate level mathematics and courses of "Programming in C and Object Oriented Programming through JAVA"

Course Educational Objective:

CEO1 To Acquire the Analysis Skill.

CEO2 To Acquire Knowledge on Basic Reasoning and Aptitude.

Syllabus:

Exercise 1:

Numbers and Fractions – H.C.F and L.C.M - Simplification and Roots

Exercise 2:

Averages – Partnership and Percentages- Ratio and proportions - Profit and Loss

Exercise 3:

Share - Simple interest and Compound Interest

Exercise 4:

Series - Coding and Decoding - Blood relation - Venn Diagrams

Calendar and Clocks - Data interpretation, tabulation and Bar graphs

Exercise 5:

Puzzle test- Problems on ages - Time and Distance

Exercise 6:

Time and Work - Pipes and Cisterns - Problems on Trains,

Exercise 7:

Boats and streams- Allegation and Mixture - Permutation and Combination

Exercise 8:

Probability - Area, Volume & surface areas - Height and Distance

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Pie charts and Line graphs – Data Sufficiency

Exercise 9:

Basics and History of C, functions, pointers, strings, files in C-language

Exercise 10:

Oops concepts, Debugging programs in C++ and Java

Exercise 11:

SQL Queries & Sub Queries, PLSQL Programming, Views, Cursors, Triggers.

Exercise 12:

Unix utilities, Concepts of Computer Networks and Operating System.

Course Outcomes:

At the end of the course, students will be able to

	Course Outcomes	POs related to COs
CO1	**Formulate** the problem quantitatively and use appropriate arithmetical methods to solve the problem	PO1
CO2	**Demonstrate** various principles involved in solving problems provide quick job functions	PO2
CO3	**Analyze** programming methodologies and design solutions to significant computational problems	PO3
CO4	**Examine** complex algorithms and techniques to conclude alternative solutions	PO4
CO5	**Implement** software systems that meet specified design and performance requirements	PO5
CO6	Work effectively in teams to **design and implement** solutions to computational problems	PO8
CO7	**Recognize** the need for and able to communicate orally and technically	PO9
CO8	**Understand** best practices and standards of application to assist in creating effective project plans	PO10
CO9	**Updating** quantitative and technical skill related to various applications further.	PO12

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III MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA311   **SOFTWARE TESTING**

PREREQUISITES: A Course on "Software Engineering"

Course Educational Objectives:

CEO1 To explore Different types of Bugs.

CEO2 To Learn about Path testing using Flow Graphs.

CEO3 To Learn basics of Data flow testing.

CEO4 To understand applications of Node Reduction Algorithm.

CEO5 To Acquire Basic Knowledge of Testing Tools like Win Runner and Load Runner.

Syllabus:

UNIT - 1 : Introduction & The Taxonomy of Bugs

Purpose of testing – Some Dichotomies – A Model for testing – The Consequences of bugs – A Taxonomy of bugs.

UNIT - 2 : Flow graphs and Path testing

Path Testing Basics – Predicates, Path Predicates and Achievable Paths - Path sensitizing- Path instrumentation - Application of path testing.

UNIT - 3 : Dataflow Testing & Paths, Path products and Regular expressions

Dataflow Testing Basics – Data flow testing strategies.

Path products & path expression – A Reduction Procedure- Applications - Regular Expressions & Flow Anomaly Detection.

UNIT - 4 : Logic Based Testing & State, State Graphs and Transition testing

Motivational Overview - Decision tables - Path expressions again - KV Charts – Specifications.

State Graphs - Good State Graphs and bad   - State Testing.

UNIT - 5 : Graph Matrices and its Application & Testing Tools

Motivational overview – The Matrix of a Graph – Relations – The Powers of a Matrix - Node Reduction Algorithm - Building Tools.

Manual testing and its Limitations - Need for Automated Testing Tools - Taxonomy of Testing Tools, Win Runner – Load Runner.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Understand** purpose, types and levels of Testing	PO1,PO2, PO3,PO9, PO12
CO2	Get **Familiarized** with Path Testing, one of the structural Testing Technique	PO1,PO2, PO3,PO11
CO3	**Infer** the Applications of Node Reduction Algorithm	PO1,PO2, PO3,PO4, PO5
CO4	**Distinguish** between Node Reduction Algorithm on Graphs and Graph Matrix	PO1,PO2, PO4,PO5
CO5	**Execute** Testcases in WinRunner and LoadRunner	PO2,PO5, PO9,PO11, PO12

TEXT BOOKS :

1. Software Testing Techniques, 2/e, 1990, Baris Beizer, Dreamtech, New Delhi, India.
2. Software Testing Tools, 2/e, 2004, Dr.K.V.K.K.Prasad , Dreamtech, New Delhi, India.

REFERENCE BOOKS :

1. The craft of software testing, 2/e, 1995, Brian Marick, Pearson Education, New Delhi, India.
2. Software Testing Techniques, 1/e, 2008 , SPD, New Delhi, India.
3. Software Testing in the Real World, 1/e, 2008, Edward Kit, Pearson Education, New Delhi, India.
4. Effective methods of Software Testing, 3/e, 2000, Perry, John Wiley, India.
5. Art of Software Testing, 3/e, 2011, Meyers, John Wiley, India.

III MCA - I Semester   **L   T   P   C**

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3   1   0   4

16MCA312   **BIG DATA ANALYTICS**

PREREQUISITES: Courses on "Data warehousing and Data Mining" and "Object Oriented Programming through JAVA".

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.

Syllabus:

UNIT - 1 :   Understanding Big Data

Datasets, Data Analysis, Data Analytics-Descriptive Analysis, Diagnostics Analytics, Predictive Analytics, Prescriptive Analytics, Big Data Characteristics – volume, velocity, variety, veracity, value, Different Types of Data – Structured Data, Unstructured Data, Semi-Structured Data

UNIT - 2 :   Hadoop Basics

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 - 3 :   Writing Hadoop MapReduce Programs

understanding the basics of MapReduce, Introducing Hadoop MapReduce-Listing Hadoop mapReduce entities,Understanding the Hadoop MapReduce scenario,Understanding the limitations of MapReduce, Writing a Hadoop MapReduce example-Understanding the steps to run a MapReduce job.

UNIT - 4 :   Learning Data Analytics

Understanding the data analytics project life cycle -Identifying the problem, Designing data requirement, Preprocessing data, Performing analytics over data, Visualizing data.

Understanding data analytics problems - Exploring web pages categorization - Identifying the problem,Designing data requirement,Preprocessing data,Performing analytics over data,Visualizing data.

UNIT - 5 : **Programming with R**

Basic Syntax, Data types, Variables, Operators, Decision Making, Loops, Functions, Vectors, lists, Matrices, Arrays, Data Frames, R Data Interfaces – CSV Files, Excel Files, Database, R charts & graphs , R statistics – Mean, Median, Mode, Linear Regression.

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Realize** characteristics of Big Data and various types of data like structured, unstructured and semistructured	PO1,PO2, PO10,PO11, PO12
CO2	**Understand** two major components of Hadoop	PO1,PO2, PO3,PO4, PO5,PO10, PO11
CO3	**Analyze** Big data using Hadoop Map Reduce programs	PO2,PO4, PO5,PO11, PO12
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

TEXT BOOKS:

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

2. "Big Data Analytics with R and Hadoop", 1e, 2013, Vignesh Prajapati, Packt Publishing Ltd, UK.

REFERENCE BOOKS:

1. "The Art of R Programming: A Tour of Statistical Software Design",revised,2011,Norman Matloff, No Starch Press

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

3. "Understanding Big Data: Analytics for Enterprise Class Hadoop and streaming Data" ,2012, Paul Zikopoulos, IBM, Chris Eaton, Paul Zikopoulos, The McGraw-Hill Companies,

4. "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications",2014, Bart Baesens,Wiley Publications .

5. "Mining of Massive Datasets", 2012, Anand Rajaraman and Jeffrey David Ullman , Cambridge University Press.

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III MCA - I Semester	L	T	P	C
	3	1	0	4

16MCA313   MOBILE APPLICATION USING ANDROID

PREREQUISITES: Courses on "Object Oriented Programming through JAVA".
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.

Syllabus:

UNIT - 1 : Introduction

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 - 2 : Creating Applications

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

UNIT - 3 : Building User Interfaces & Databases

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

UNIT - 4 : Content Providers & Services

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

UNIT - 5 : Android Components

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

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
CO1	**Understand** the basic structure of Android operating system.	PO1,PO2,PO4
CO2	**Demonstrate** the creation of mobile applications.	PO1,PO5,PO8
CO3	**Interpret** the database design concepts for different mobile applications.	PO1,PO3,PO5
CO4	**Enumerate** the different services applied for mobile application development.	PO1,PO6,PO7
CO5	**Compare** various components and its uses for mobile application development.	PO1,PO5,PO12

TEXT BOOK

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

REFERENCES

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

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III MCA - I Semester

	L	T	P	C
	4	0	0	4

16MCA314A   **INFORMATION RETRIEVAL SYSTEMS**

(Elective – III)

PREREQUISITES: A course on "Data Warehousing and Data Mining".

Course Educational Objectives:

CEO1 To present the scientific underpinnings of the field of Information Search and Retrieval.

CEO2 To learn the important concepts, algorithms, and data/file structures that are necessary to specify, design, and implement Information Retrieval (IR) systems.

CEO3 To appreciate the capabilities and limitations of information retrieval systems.

CEO4 To understand the design and implementation of retrieval systems for text and other media.

CEO5 To evaluate the performance of an information retrieval system.

CEO6 To identify current research problems in information retrieval.

Syllabus:

UNIT - 1 :   Introduction and Modeling

Definition- Objectives- Functional Overview- Relationship to DBMS- Digital libraries and Data Warehouses.

A Taxonomy of Information Retrieval Models - Formal Characterization of Information Retrieval Models-Classic Information Retrieval-Set Theoretic Model-Algebraic Models - Probabilistic Models.

UNIT - 2 :   Indexing and Data Structures

Objectives-Indexing Process-Automatic Indexing-Information Extraction.

Introduction-Stemming Algorithms-Inverted file structures-N-gram data structure- PAT data structure-Signature file structure-Hypertext and XML data structures.

UNIT - 3 :   Automatic Indexing and Document and Term Clustering

Classes of automatic indexing-Statistical indexing-Natural language-Concept indexing-Hypertext linkages.

Thesaurus generation-Item clustering-Hierarchy of clusters.

UNIT - 4 : Query Languages and User Search Techniques

Introduction-keyword based querying-pattern matching- Structural Queries- Query Protocols. Search statements and binding-Similarity measures and ranking-Relevance feedback-Selective dissemination of information search-Weighted searches of Boolean systems.

UNIT - 5 : Searching the Web

Introduction –Challenges-Characterizing the Web- Search Engines-Browsing   Meta Searchers-Finding the Needle in the Haystack-Searching using Hyperlinks.

Course Outcomes:

On successful completion of this course, students will be able to:

COURSE OUTCOMES		
CO1	**Explain** the Principles of Information Retrieval and Retrieval models.	PO1
CO2	**Apply** appropriate Classification algorithms and Clustering algorithms to classify and cluster the web documents.	PO1,PO2, PO3
CO3	**Describe** different Processing steps in searching documents using search engines and Analyzing the link analysis, page rank algorithm.	PO1,PO2, PO3
CO4	**Explain** the advanced Semantic based Models in Web Search System.	PO1,PO2, PO3,PO5
CO5	**Design** of a Recommender system and Knowing different Diversifications for the web.	PO1,PO2, PO3,PO4, PO5,PO6

TEXT BOOKS :

1. Information Storage and Retrieval Systems Theory and implementation, 2/e, 2000,Gerald J.Kowalski, Mark T. Maybury, Springer International Edition, Kluwer Academic Press, NewDelhi, India. (Unit 1, 4, 5)

2. Modern Information Retrieval , 2007, Ricarbo Baeza – Yates, Berthier Ribeiro- Neto, Pearson Education, NewDelhi, India.(Unit 1, 2, 3)

REFERENCE BOOKS :

1. Introduction to Information Retrieval , 1/e, 2008, Christopher D. Manning and Prabhakar Raghavan, Cambridge University Press(Online).

2. Information Storage and Retrieval, 2006, Robert Korfhage, John Wiley & Sons, New Delhi, India.

3. Information Retrieval Data structures & Algorithms, 2008, William B. Frakes, Ricardo Baeza-Yates, Pearson Education, NewDelhi, India.

4. Search Engines: Information Retrieval in Practice, 2009, W.Bruce croft, Donald Metzler, Trevor Strohman, Addison-wesley, New Delhi, India.

5. Mining the Web: Discovering knowledge from Hypertext data,1/e, 2002,Soumen Chakrabarti, Morgan Kaufmann Publishers, New Delhi, India.

MCA DEPARTMENT

III MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA314B   **WEB MINING**

(Elective – III)

PREREQUISITES: A course on "Data Warehousing and Data Mining".

Course Educational Objectives:

CEO1: To focus on a detailed overview of the data mining process and techniques, specifically those that are relevant to Web mining.

CEO2: To Understand the basics of Information retrieval and Web search with special emphasis on web Crawling.

CEO3: To appreciate the use of machine learning approaches for Web Content Mining.

CEO4: To understand the role of hyper links in web structure mining.

CEO5: To appreciate the various aspects of web usage mining.

Syllabus:

UNIT - 1 :   Introduction

Introduction: What is the World Wide Web? . A Brief History of the Web and the Internet . What is Web Mining?.

Information retrieval and Web search: Information retrieval Models -- Relevance Feedback - Text and Web page Pre-processing – Inverted Index – Latent Semantic Indexing – Web Search – Meta-Search – Web spamming

UNIT - 2 :   Web Content Mining

Supervised Learning: Decision tree - Naïve Bayesian Text Classification - Support Vector Machines K-Nearest Neighbourhood Learning - Classifier Evaluation

Unsupervised Learning: K-means Clustering - Hierarchical Clustering – Distance Functions – Cluster Evaluation.

UNIT - 3 :   Web Link Mining

Link Analysis: Social Networks Analysis – Co-Citation and Bibliographic Coupling - Page Rank – HITS .

Web Crawling: A Basic Crawler Algorithm - Implementation Issues - Universal Crawlers - Focused Crawlers - Topical Crawlers - Evaluation

UNIT - 4 :   Structured Data Extraction Wrapper Generation
Structured Data Extraction: Wrapper Generation: Preliminaries - Wrapper Induction – Instance Based Wrapper Learning - Automatic Wrapper Generation: Problems - String

Matching and Tree Matching - Multiple Alignment - Building DOM Trees - Extraction Based on a Single List Page and Multiple Pages.

UNIT - 5 :   Web Usage Mining

Web Usage Mining: Data Collection and Pre-Processing - Data Modeling for Web Usage Mining - Discovery and Analysis of Web Usage Patterns – Applications - Collaborative Filtering - Recommender Systems – Web Recommender systems based on User and Item

Course Outcomes:

COURSE OUTCOMES		
CO1	**Understand** the foundation concepts of world wide web, web mining and web search , Identify different components of a web used for web mining.	PO1
CO2	**Apply** different machine learning techniques (i.e. supervised and unsupervised learning) for web content mining.	PO1,PO2, PO3
CO3	**Understand** the social network analysis, implementation of page rank algorithm and basic crawler algorithm for mining information.	PO1,PO2, PO3
CO4	**Analyze** the social media data and extraction of structured data using appropriate web mining techniques.	PO1,PO2, PO3,PO5
CO5	**Design** a system to harvest information available on the web to build recommender system and modify an existing search engine to make it personalized.	PO1,PO2, PO3,PO4, PO5,PO6

TEXT BOOK:

1. Bing Liu, " Web Data Mining: Exploring Hyperlinks, Contents, and Usage Data (Data - Centric Systems and Applications)", Springer; 2nd Edition 2009

REFERENCE BOOKS:

1. Guandong Xu, Yanchun Zhang, Lin Li , "Web Mining and Social Networking: Techniques and Applications", Springer; 1st Edition .2010

2. Zdravko Markov, Daniel T. Larose, "Data Mining the Web: Uncovering patterns in Web Content, Structure, and Usage",John Wiley & Sons, Inc., 2007

3. Soumen Chakrabarti , "Mining the Web: Discovering Knowledge from Hypertext Data", Morgan Kaufmann; edition 2002

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MCA DEPARTMENT

III MCA - I Semester	**L**	**T**	**P**	**C**
	4	**0**	**0**	**4**

16MCA314C   **SEMANTIC WEB**

(Elective – III)

PREREQUISITES: Courses on "Web Programming" and "Computer Networks".

Course Educational Objectives:

CEO1   The main objective of the course is to develop a critical appreciation of semantic technologies as they are currently being developed.

CEO2   To explain the features, rationale and advantages of Semantic Web technology.

CEO3   To explain the concepts of graph-based RDF model and RDF Schema.

CEO4   To analyze the requirements and features of web ontology language (OWL).

CEO5   To discuss the methodologies in ontology engineering and research issues in Semantic Web technology.

Syllabus:

UNIT - 1 :   Web Intelligence

Empowering the Information Age-Thinking and Intelligent Web Applications The Information Age -The World Wide Web - Limitations of Today's Web -The Next generation Web What is Decidable- Mathematical Logic- Kurt Godel- knowledge Representation- Computational Logic- AI - The Semantic Web-What is Machine Intelligence-What is Machine Intelligence -Alan Turing-Turing test-Machine Intelligence- Description Logic- Ontology - Inference Engines - Software Agents-Limitations and Capabilities.

UNIT - 2 :   Ontology in Computer Science and Knowledge Representation in Description Logic

Defining the term Ontology-Differences among taxonomies- Thesauri and Ontologies- Classifying Ontologies- Web Ontology description languages-Ontologies- Categories and intelligence.

Introduction-Example-Family of Attribute Languages-Inference problems.

UNIT - 3 :   RDF and RDF Schema

Introduction- Xml essentials- RDF-RDF Schema- A Summary of RDF/RDF Schema Vocabulary.

UNIT - 4 :   OWL

Introduction- Requirements for web ontology Description Languages- Header Information, Versioning and Annotation Properties-Properties- Classes-Individuals- Data types- A summary of the OWL Vocabulary.

UNIT - 5 :   Semantic Web Services

Introduction- Web Service Essentials- OWL–S Service Ontology-OWL–S example- Semantic Web applications-Semantic Search- Semantic Bioinformatics- E-Learning.

Course Outcomes:

On successful completion of this course, students will be able to

COURSE OUTCOMES		
CO1	**Acquire** the knowledge of overall architecture of the semantic web.	PO1,PO2,PO3
CO2	**Applying** Description Logic to construct a knowledge Base.	PO1,PO2,PO3, PO4,PO5
CO3	**Design** an ontology using Resource Description Framework(RDF) and RDF schema models.	PO1,PO2, PO3,PO4,PO5, PO8
CO4	**Defining** the requirements for web ontology description languages and designing ontology using web ontology language.	PO1,PO2, PO3,PO4,PO5,PO6 PO8
CO5	**Applying** Semantic Web and Ontology technologies to solve real life problems.	PO1,PO2, PO3,PO4,PO5,PO6 PO8,PO11, PO12

TEXT BOOKS :

1. Thinking on The Web, 2/e, 2010, H. Peter Alesso and Craig F. Smith, Wiley India, New Delhi, India. (Unit 1,5)

2. Semantic Web Concepts, Technologies and Applications, 2010, Karin K. Breitman, Marco Antonio Casanova, Walter TruszKowski, Springer International Edition, NewDelhi, India. (Unit 2,3,4,5)

REFERENCE BOOKS :

1. A Semantic Web Primer, 2/e, 2008, Grigoris Antoniou and Frank VanHarmelen, The MIT Press, Cambridge Massachusetts, London, England, England(Online).

2. Towards the Semantic Web: Ontology Driven Knowledge Management, 2004, John Davis Dieter Fensal, Frank Van Harmelen, John Wiley&Sons, Ltd. England.

3. Information Sharing on the Semantic Web, 2010, Heiner Stuckenschmidt, Frank Van Harmelen, Springer International Edition, NewDelhi, India.

4. Creating the Semantic Web with RDF, 2001, John Hjelm, Wiley, New Delhi, India.

5. Introduction to the Semantic Web and Semantic Web Services, 2010, Liyang Yu, Chapman Hall, New York.

MCA DEPARTMENT

III MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA315A   **INTERNET OF THINGS**

(Elective – IV)

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.

Syllabus:

UNIT - 1:   Introduction

Introduction, Background and Initial Visions - Definitions and Functional Requirements – Opportunities and Motivation – A Possible Architecture for the Future Internet of Things- IoT: A Web 3.0 View - **Four Pillars of IoT -** The Horizontal, Verticals, and Four Pillars M2M: The Internet of Devices ,RFID: The Internet of Objects, WSN: The Internet of Transducers. SCADA: The Internet of Controllers.

The DNA of IoT - DCM: Device, Connect, and Manage, Device: Things that Talk, Connect: Via Pervasive Networks, Wired Networks, Wireless Networks Satellite IoT Manage: To Create New Business Value

UNIT - 2 :   IoT Middleware and Protocols

Middleware For IoT - Overview of Middleware, Communication Middleware for IoT-MTC/M2M Middleware, SCADA Middleware , RFID Middleware, WSN Middleware.

Protocol Standards for IoT - IoT Protocol Standardization Efforts- M2M and WSN Protocols, SCADA and RFID Protocols, Issues with IoT Standardization, Unified Data Standards: A Challenging Task, Unified Identification of Objects.

UNIT - 3 :   Web of Things

Web of Things versus Internet of Things - Two Pillars of the Web-**Architecture standardization for WoT -** Platform Middleware for WoT - Standards for M2M, Frameworks for WSN,   Standards for SCADA, Extensions on RFID Standards- Unified Multitier WoT Architecture, SOA/EAI versus SODA/MAI, OSGi: The Universal Middleware, WoT Framework Based on Data Standards- WoT Portals and Business Intelligence, Challenges of IoT Information Security.

UNIT - 4 :   Integrated

Integrated Billing Solutions in the Internet of Things - 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 - Product as a Service (PaaS), Information Service Provider, End-userInvolvement, Right-time Business Analysis and Decision making.

UNIT - 5 :   Applications

Ubiquitous IoT Applications - A Panoramic View of IoT Applications - Important Vertical Applications- Telematics and Intelligent Transport Systems, Smart Grid and Electric Vehicles , Smarter Planet and Smart Buildings- Using Internet of Things Concepts to Provide High Interoperability for Logistics Systems - Semantic Web- Ontology - Ontology and the Organizational Perspective,

Ontology and the IT-System Perspective, Ontology and the Data Perspective, Ontologies in Multi-agent Systems, The Role of a Top-level Ontology

Course Outcomes:

At the end of the course, students will be able to

COURSE OUTCOMES		
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

TEXT BOOKS:

1. The Internet of Things in the Cloud: A Middleware Perspective - Honbo Zhou – CRC Press – 2012

2. Architecting the Internet of Things - Dieter Uckelmann; Mark Harrison; Florian Michahelles- (Eds.) – Springer – 2011

REFERENCE BOOKS:

1. 1.Networks, Crowds, and Markets: Reasoning About a Highly Connected World - David Easley and Jon Kleinberg, Cambridge University Press - 2010

2. The Internet of Things: Applications to the Smart Grid and Building Automation by - Olivier

3. Hersent, Omar Elloumi and David Boswarthick - Wiley -2012

4. 3.. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applications and Protocols", Wiley, 2012

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III MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA315B   **DESIGN PATTERNS**
(Elective – IV)

PREREQUISITES: A course on "Software Engineering"

Course Educational Objective:

CEO1   To provide an understanding of hands on experience with the principles and process of gathering requirements for, formally specifying, designing, implementing, testing and maintaining a large software system.

CEO2   To gain experience with designing a project in order to make division of labor and concurrent development possible.

Syllabus:

UNIT - 1 :   Introduction

What Is a Design Pattern?, Design Patterns in Smalltalk MVC, Describing Design Patterns, The Catalog of Design Patterns, Organizing the Catalog, How Design Patterns Solve Design Problems, How to Select a Design Pattern, How to Use a Design Pattern.

UNIT - 2 :   A Case Study

Designing a Document Editor : Design Problems, Document Structure, Formatting, Embellishing the User Interface, Supporting Multiple Look-and-Feel Standards, Supporting Multiple Window Systems, User Operations Spelling Checking and Hyphenation, Summary .

UNIT - 3 :   Creational Patterns & Structural Pattern Part-I

One of a kind Object(Singleton), Baking with OO Goodness(Factory Pattern), Builder, Prototype, Structural Pattern Part-I - Adapter, Bridge, Composite.

UNIT - 4 :   Structural Pattern Part-II & Behavioral Patterns Part-I

Decorator, Facade, Flyweight, Proxy. Behavioral Patterns Part-I - Chain of Responsibility, Command, Interpreter, Iterator.

UNIT - 5 :   Behavioral Patterns Part-II

Mediator, Memento, Observer, State, Strategy, Template Method ,Visitor, Better Living with Pattern: Pattern in the Real world.

Course Outcomes:

On successful completion of this course, students will be able to

	COURSE OUTCOMES	
CO1	**Illustrate** the basic principles, procedures, components and usage of design patterns	PO1
CO2	**Analyze** the design patterns in documents structure and maintenance	PO2
CO3	**Examine** on various types as created patterns for designing different applications	PO1,PO2,PO3, PO5, PO12
CO4	**Examine** on various types of structural patterns for designing different applications	PO1,PO2,PO3, PO5,PO12
CO5	**Examine** on various types of behavioral patterns for designing different applications	PO1,PO2,PO3, PO5,PO12

TEXT BOOKS :

1. Design Patterns, Erich Gamma, Pearson Education
2. Head First Design Patterns, 5/e, Eric Freeman, O'reilly, SPD Publishers, Mumbai.

REFERENCE BOOKS :

1. Design Patterns Explained, 2/e, Alan Shalloway, Pearson Education, New Delhi.
2. Design Pattern in Java Software, 2009, Steven John & Wake, Pearson Education, New Delhi.
3. Elements of Re-usable Object Oriented Software, 2010, Erich Gamma, Pearson Education, New Delhi.
4. Pattern Oriented Software Architecture, F.Buschmann & others, ,John Wiley & Sons.

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III MCA - I Semester	L	T	P	C
	4	0	0	4

16MCA315C   **ETHICAL HACKING**

(Elective – IV)

PREREQUISITES: A course on "Computer Networks"

Course Educational Objectives:

CEO1: To learn about how systems vulnerabilities manifest themselves and why hackers continue to enjoy success breaking into systems, despite increasing attention paid to cyber defense.

CEO2: To gain experience with a systematic hacking methodology.

CEO3: To learn about and experiment with hacking tools that can be applied at different stages of the hacking process.

Syllabus:

UNIT - 1 :   Introduction to Ethical Hacking, Ethics, and Legality:

Ethical Hacking Terminology, Different Types of Hacking Technologies, Different Phases Involved in Ethical Hacking and Stages of Ethical Hacking: Passive and Active Reconnaissance, Scanning, Gaining Access, Maintaining Access, Covering Tracks, Hacktivism, Types of Hacker Classes, Skills Required to Become an Ethical Hacker, Vulnerability Research, Ways to Conduct Ethical Hacking, Creating a Security Evaluation Plan, Types of Ethical Hacks, Testing Types, Ethical Hacking Report

Footprinting and Social Engineering: Footprinting , Information Gathering Methodology, Competitive Intelligence ,DNS Enumeration Who is and ARIN Lookups, Types of DNS Records, Traceroute, E- Mail Tracking , Web Spiders, Social Engineering, Common Types Of Attacks, Insider Attacks, Identity Theft, Phishing Attacks, Online Scams, URL Obfuscation, Social-Engineering Countermeasures.

UNIT - 2 :   Scanning and Enumeration

Scanning, types of Scanning , CEH Scanning Methodology ,Ping Sweep Techniques, Nmap Command Switches, SYN, Stealth, XMAS, NULL, IDLE, and FIN Scans, TCP Communication Flag Types, War-Dialing Techniques, Banner Grabbing and OS Fingerprinting Techniques, Proxy Servers, Anonymizers , HTTP Tunneling Techniques, IP

Spoofing Techniques, Enumeration, Null Sessions, SNMP Enumeration, Windows 2000 DNS Zone Transfer, Steps Involved in Performing Enumeration.

System Hacking

Understanding Password - Cracking Techniques, Understanding the LAN Manager Hash Cracking Windows 2000 Passwords, Redirecting the SMB Logon to the Attacker SMB Redirection, SMB Relay MITM Attacks and Countermeasures NetBIOS DoS Attacks, Password - Cracking Countermeasures, Understanding Different Types of Passwords Passive Online Attacks, Active Online Attacks, Offline Attacks Nonelectronic Attacks, Understanding Keyloggers and Other Spyware Technologies Understand Escalating Privileges, Executing Applications, Buffer Overflows, Understanding Rootkits Planting Rootkits on Windows 2000 and XP Machines, Rootkit Embedded TCP/IP Stack Rootkit Countermeasures, Understanding How to Hide Files, NTFS File Streaming NTFS Stream Countermeasures, Understanding Stegnography Technologies, Understanding How to Cover Your Tracks and Erase Evidence, Disabling Auditing, Clearing the Event Log

UNIT - 3 : Trojans, Backdoors, Viruses, and Worms

Trojans and Backdoors, Overt and Covert Channels, Types of Trojans, Reverse-Connecting Trojans, Netcat Trojan, Indications of a Trojan Attack, Wrapping, Trojan Construction Kit and Trojan Makers, Countermeasure Techniques in preventing Trojans, Trojan - Evading Techniques, System File Verification Sub- objective to Trojan Countermeasures Viruses and Worms, Difference between a Virus and a Worm ,Types of Viruses, Understand Antivirus Evasion Techniques, Understand Virus Detection Methods

Sniffers

Protocols Susceptible to Sniffing, Active and Passive Sniffing, ARP Poisoning, Ethereal Capture and Display Filters, MAC Flooding, DNS Spoofing Techniques, Sniffing Countermeasures

Denial of Service and Session Hijacking

MCA -R13 Regulations 87 Denial of Service, Types of DoS Attacks, DDoS Attacks, BOTs/BOTNETs, "Smurf" Attack, "SYN" Flooding, DoS/DDoS Countermeasures, Session Hijacking, Spoofing vs. Hijacking, Types of Session Hijacking, Sequence Prediction, Steps in Performing Session Hijacking, Prevention of Session Hijacking.

UNIT - 4 : Hacking Web Servers, Web Application Vulnerabilities, and Web- Based Password Cracking Techniques

Hacking Web Servers, Types of Web Server Vulnerabilities, Attacks against Web Servers, IIS Unicode Exploits, Patch Management Techniques, Web Server Hardening Methods Web Application Vulnerabilities, Objectives of Web Application Hacking, Anatomy of an Attack, Web Application Threats, Google Hacking, Web Application Countermeasures Web_Based Password Cracking Techniques, Authentication Types, Password Cracker, Password Attacks: Classification ,Password-Cracking Countermeasures

SQL Injection and Buffer Overflows

SQL Injection, Steps to Conduct SQL Injection, SQL Server Vulnerabilities, SQL Injection Countermeasures Buffer Overflows, Types of Buffer Overflows and Methods of Detection, Stack- Based Buffer Overflows, Buffer Overflow Mutation Techniques

UNIT - 5 : Linux Hacking

Linux Basics, Compile a Linux Kernel, GCC Compilation Commands, Install Linux Kernel Modules, Linux Hardening Methods Penetration Testing Methodologies Security Assessments

Penetration Testing Methodologies,

Penetration Testing Steps, Pen - Test Legal Framework, Automated Penetration Testing Tools Pen_Test Deliverables

Course Outcomes:

On successful completion of this course, students will be able to

COURSE OUTCOMES		POs mapping
CO1	**Understand** the Ethical Hacking terminology and technology.	**PO1,PO3**
CO2	**Demonstrate** the knowledge on Footprinting, information gathering methodologies and competitive intelligence.	**PO1,PO3, PO4,PO12**
CO3	**Analyze** various scanning and enumeration methodologiesand **illustrate** system hacking and cracking techniques.	**PO1,PO2, PO3,PO4, PO12**
CO4	**Learn** various types of viruses, Understand Antivirus Evasion	**PO1,PO3,**

	Techniques and Understand Virus Detection Methods.	**PO4,PO5, PO12**
CO5	**Identify** the steps to follow the Penetration Testing and use proper testing tools.	**PO1,PO3, PO5, PO12**

TEXT BOOK:

1. CEH official Certified Ethical Hacking Review Guide, Wiley India Edition

REFERENCE BOOKS:

1. Kenneth C.Brancik "Insider Computer Fraud" Auerbach Publications Taylor & Francis Group–2008.

2. Ankit Fadia " Ethical Hacking" second edition Macmillan India Ltd, 2006

3. Ethical Hacking & Network Defense, Michael T. Simpson edition3. Hacking Exposed Windows, Joel Scambray, cissp, Stuart Mcclure, Cissp, Third Edition, Tata Mc Graw hill edition

4. Hacking Exposed Window server 2003, Joel Scambray Stuart Mcclure, Tata Mc Graw hill edition

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III MCA - I Semester	L	T	P	C
	0	0	3	2

16MCA316   **SOFTWARE TESTING LAB**

PREREQUISITES: A course on "Software Testing"

Course Educational Objectives:

CEO1: To Learn to use the testing tools to carry out the functional testing, load/stress testing

CEO2: To Learn to use the following automated testing tools to automate testing

Syllabus:

EXCERCISES:

1)   Win Runner/ QTP for functional Testing

2)   LoadRunner for Load/Stress testing.

3)   Test Director for test management

Corse Outcomes:

On successful completion of this course, students will be able to

Course Outcomes		POs related to COs
CO1	**Demonstrate** the knowledge on Object Oriented Analysis and Design	PO1
CO2	**Analyze** various complex models and draw UML diagrams.	PO2
CO3	**Design and develop** models for real time systems using UML diagrams.	PO3
CO4	**Conduct investigation** on each real time entities and find the solutions for designing new models.	PO4
CO5	Select appropriate design tools and procedure **to simulate** real time systems.	PO5
CO6	**Follow** ethical principles in designing, simulating and	PO8

	implementing various system models.	
CO7	Do **experiments e**ffectively as an individual and as a member in a group.	PO9
CO8	**Communicate** verbally and in written form, the understandings about the experiments.	PO10
CO9	Continue **updating** the skill related to Object Oriented Analysis and Design for various applications during their life time	PO12

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III MCA - I Semester	L	T	P	C
	0	0	3	2

16MCA317   **BIG DATA ANALYTICS LAB**

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.

Syllabus:

EXCERSCISES:

1) Implement Basic R Mathematical Commands

2) Implement R Programs to Illustrate Decision Making and Loops

3) Exercises on Lists using R Tool

4) Implement R Vectors

5) Implement R Matrices

6) Implement R Data Frames

7) Implement R Statistical Methods

8) Implement R Functions

9) Illustrate R Charts & Graphs

10) Extract Data From CSV, Excel and Database Files

11) Illustrate Prediction using Linear Regression

Course Outcomes:

On successful completion of this course, students will be able to

COURSE OUTCOMES		
CO1	**List** motivation for Learning a Programming language and any modern tool.	PO1
CO2	**Import, Review, Manipulate, Summarize** and **Analyse** Data sets in	PO2

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	R.	
CO3	**Implement** Basic R Mathematical Commands, Lists, Vectors Matrices, Data Frames, Statistical Methods, Functions.	PO3
CO4	**Extract** Data From CSV, Excel and Database Files , **Analyze** , **Design** and **Apply** R Programs to Illustrate Decision Making Loops, Charts and Graphs.	PO4
CO5	**Create** a dataset , Select and **Develop** a Program to **Apply** Linear Regression model for Prediction Analysis using any Modern Tool.	PO5
CO6	Follow ethical principles in **Analyzing, designing** and **implementing** various Big Data Analytics Tasks.	PO8
CO7	Do **experiments** effectively as an individual and as a member in a group.	P09
CO8	**Communicate** verbally and in written form, the understandings about the experiments.	PO10
CO9	**Continue** updating their skill related to Big data Analytics Tasks implementation for various application during their life time	PO12

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III MCA - I Semester	L	T	P	C
	0	0	3	2

16MCA318   MOBILE APPLICATION USING ANDROID LAB

PREREQUISITES: A course on "Mobile Application Using Android"

Course Educational Objectives:

CEO1 The students are inculcate with development of Mobile APPS by using Android Studio.

Syllabus:

EXERCISES:

1. Exercises must be practiced based on the theoretical concepts covered in the subject "Mobile Application using Android"

2. Every student must develop a small mobile app by taking their own example.

Course Outcomes:

On successful completion of this course, students will be able to

COURSE OUTCOMES		
CO1	**Understand** the background Android and Android development framework	PO1
CO2	**Analyze** the basic installation setup for Android studio project.	PO2
CO3	**Develop** to create and build android project.	PO3
CO4	**Design** Application manifest file using manifest editors for Android project.	PO4
CO5	**Design** of building user interface for mobile applications using Android.	PO5
CO6	**Apply and construct** for working with SQLite databases.	PO8
CO7	**Apply**ing the concept of Android context providers.	P09
CO8	**Apply**ing various android components to build mobile applications using Android.	PO10
CO9	**Develop** small mobile applications in real time environment by applying various concepts.	PO12

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III MCA - II Semester	**L**	**T**	**P**	**C**
	0	**0**	**0**	**2**

16MCA321   **COMPREHENSIVE VIVA -VOCE**

PREREQUISITES: All core courses.

Course Educational Objectives:

CEO1   The students to review all core courses.

A Student has to undergo a Comprehensive Viva - Voce pertaining to the student specialization will be conducted for 100 marks at the end of III-II Semester by the three member committee. He /She should secure 50% marks to acquire the required credits.

Course Outcomes:
On completion of Comprehensive work the student will be able to:

COURSE OUTCOMES		POs related to COs
CO1	**Demonstrate** in-depth knowledge on Core Subjects of Computer Applications.	PO1
CO2	**Identify, analyze and formulate** complex problem.	PO2
CO3	**Design** solutions to the Complex Problems.	PO3
CO4	Write and **Execute** test cases to the applications.	PO4
CO5	**Understand** the usage of appropriate techniques and tools necessary for solving real Time Applications.	PO5
CO6	**Understand** professional and ethical responsibilities for developing and executing an Application.	PO8
CO7	**Function** effectively as individual and a member in the project team.	PO9
CO8	**Develop** communication skills, both oral and written for preparing and presenting project and Seminar report.	PO10
CO9	**Engage** in lifelong learning to **improve** knowledge and competence in the chosen area of the project.	PO12

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III MCA - II Semester	**L**	**T**	**P**	**C**
	0	**0**	**0**	**2**

16MCA322   **PROJECT SEMINAR**

PREREQUISITES: No prerequisite is required as such, knowledge on recent technological developments may be useful.

Course Educational Objectives:

CEO1   The students should collect information on specialized topic and prepare a technical

CEO2   skills and presentation skills acquired by the students in the course of MCA and to analyze computer report, showing his understanding about the topic.

The objective of the Seminar is to evaluate the skills required for the computer application professionals viz., logical skills, design and analysis skills, technical skills, development skills, communication application capabilities.

For the Seminar the students shall collect the information on any latest technology relevant to computer applications and prepare a report showing his/her understanding about the topic and submit the same to the department before making presentation. The report and the presentation shall be evaluated by the three member committee which carries 100 marks. He/She has to score 50% marks to obtain required credits.

Course Outcomes:
On completion of Seminar work the student will be able to:

COURSE OUTCOMES		POs related to COs
CO1	Demonstrate in-depth knowledge on the Seminar topic	PO1
CO2	Identify, analyze and formulate the complex Problem.	PO2
CO3	Design solutions to the chosen seminar problem.	PO3

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CO4	**Undertake** investigation of the seminar problem to provide valid conclusions.	PO4
CO5	Use the appropriate techniques, resources and modern engineering tools necessary for **simulating** the seminar problem.	PO5
CO6	**Apply** Seminar results for sustainable development of the society.	PO6
CO7	**Understand** the impact of seminar results in the context of environmental sustainability.	PO7
CO8	**Understand** professional and ethical responsibilities for implementing the seminar problem.	PO8
CO9	**Function** effectively as individual and a member in the project team.	PO9
CO10	**Develop** communication skills, both oral and written for preparing and presenting seminar report.	PO10
CO11	**Demonstrate** knowledge and understanding of cost and time analysis required for carrying out the seminar as a project.	PO11
CO12	**Engage** in lifelong learning to improve knowledge and competence in the chosen area of the seminar.	PO12

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III MCA - II Semester	L	T	P	C
	0	0	0	12

16MCA323   **PROJECT WORK**

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 III- II semester

Course Outcomes:
On completion of project work the student will be able to:

	COURSE OUTCOMES	POs related to COs
CO1	**Demonstrate** in-depth knowledge on the project topic.	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.	PO3
CO4	Undertake **investigation** of project problem to provide valid conclusions.	PO4
CO5	**Use** the appropriate techniques, resources and modern engineering tools necessary for project work.	PO5
CO6	**Apply** project results for sustainable development of the society.	PO6
CO7	**Understand** the impact of project results in the context of environmental sustainability.	PO7
CO8	**Understand** professional and ethical responsibilities while executing the project work.	PO8
CO9	**Function** effectively as individual and a member in the project team.	PO9
CO10	**Develop** communication skills, both oral and written for preparing and presenting project report.	PO10
CO11	**Demonstrate** knowledge and understanding of cost and time analysis required for carrying out the project.	PO11
CO12	**Engage** in lifelong learning to **improve** knowledge and competence in the chosen area of the project.	PO12