ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE
(AFFILIATED TO UNIVERSITY OF MYSORE)
REACCREDITED BY NAAC EITH A GRADE

PROGRAMME: M.Sc COMPUTER SCIENCE

CBCS WITH LEARNING OUTCOME BASED CURRICULUM

Academic year 2018-19 onwards

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ST.PHILOMENA'S COLLEGE (Autonomous) MYSORE

Master of Science in Computer Science

The course will be started under the existing regulations governing two year-four semesters Choice Based Credit System (CBCS) and Continuous Assessment Grading Pattern (CAGP) Master's Degree Programmes under Autonomous Structure.

Guidelines/Regulations

1. Eligibility for Admission

Candidates shall have studied any branch of basic sciences with Computer Science as one of the major/optional/subsidiary subjects securing 45% (40% in case of SC/ST candidates) in the aggregate marks in Computer Science of all the semesters at the undergraduate level. The qualification and the percentage of marks for admission shall be as per the guidelines issued by the University of Mysore from time to time.

Note:-In case of candidates who have taken more than three years to complete their Bachelor's Degree, the percentage of mark is arrived as per the guidelines issued by University of Mysore from time to time.

2. Duration of the Programme

The duration of the Programme shall extend over 4 semesters (two academic years) of 20 weeks each including instructions and examinations.

3. Maximum Period for Completion of the Programme

The candidates shall complete the programme within 4 years from the date of admission. The term completing the programme means passing all the prescribed examinations of the programme to become eligible for the degree. No candidate shall be permitted to appear for the examinations after the prescribed period for completing the programme. Whenever a candidate opts for blank semesters/ dropped papers, he/she have to study the prevailing papers offered by the department when he /she continues his /her studies.

4. Medium of Instruction

The medium of instruction shall be English.

5. Hours of Instruction per Week

There shall be 24-30 hours of instructions per week in subjects without practical/field-work and 28-34 hours of instructions per week in subjects with practical/field-work. These hours may be distributed for lectures, seminars, tutorials, practical, project-work and other modes of instruction which individual courses may demand.

6. Attendance

Each paper (theory/practical) shall be treated as an independent unit for the purpose of attendance. A student shall attend a minimum of 75% of the total instruction hours in a paper (theory/practical) including tutorials and seminars in each semester. There shall be no provision for condonation of shortage of attendance and a student who fails to secure 75% attendance in a paper shall be required to repeat that semester with the payment of semester fees.

7. Guidelines to Implement CBCS & CAGP Master's Degree Programme

Course: Every paper offered will have three components associated with the teaching-learning process, namely

(a) **L -** Lecture (b) **T -**Tutorial   (c) **P** - Practical

Where

L -Stands for Lecture session.

T - Stands for Tutorial session consisting participatory discussion/self-study/desk work/ brief seminar presentations by students and such other novel methods that make a student to absorb and assimilate more effectively the contents delivered in the Lecture classes.

P -Stands for Practical session and it consists of Hands on experience / Laboratory Experiments/Field Studies/Case studies that equip students to acquire the much required skill component.

In terms of credits, every one hour session of L amounts to one credit per semester and a minimum of two hour session of T or P amounts to one credit per semester, over a period of one semester of 16 weeks for teaching – learning process. The total duration of a semester is 20 weeks inclusive of semester end examination.

A paper shall have either one or two or all the three components. That means a paper may have only lecture component, or only practical component or combination of any two or all the three components.

The total credit earned by a student at the end of the semester upon successfully completing the course is equal to L + T + P of each paper.

Different papers of study are labelled and defined as follows:

Hard Core Paper

A paper which should compulsorily be studied by a candidate as a core requirement is termed as a **Hard Core Paper**.

Soft Core Paper

If there is a choice or an option for the candidate to choose a paper from a pool of papers from the main discipline subject of study or from a sister/related discipline / subject which supports the main discipline/ subject and interdisciplinary is termed as a **Soft Core Paper**.

Elective Paper

Generally a paper which can be chosen from a pool of papers and which may be very specific or specialized or advanced or supportive to the discipline / subject of study or which provides an extended scope or which enables an exposure to some other discipline / subject / domain or nurtures the candidate's proficiency / skill is called an Elective Paper.

Elective papers may be offered by the main discipline / subject of study or by sister / related discipline / subject of study. *A Soft Core paper may also be considered as an elective.*

Open Elective

An elective paper chosen generally from an unrelated discipline / subject, with an intention to seek exposure is called an **open elective. A core paper offered in a discipline / subject may be treated as an elective by other discipline / subject and vice versa**.

Project work / Dissertation work

It is a special paper involving application of knowledge in solving / analyzing / exploring a real life situation / difficult problem.

Minor Project Work

A project work up to 4 credits is called Minor Project work.

Major Project Work

A project work of 6 to 8 credits is called Major Project Work.

Dissertation Work

A project work can be of 10 – 12 credits. A Project /Dissertation work may be a hard core or a soft core as decided by the BOS concerned.

8. Scheme of Instruction

8.1A candidate has to earn a minimum of *76 credits*, for successful completion of a Master's Degree with a distribution of credits for different papers as given in the following table.

Paper Type	Credits
Hard Core	A minimum of 42, but not exceeding 52
Soft Core	A minimum of 16
Open Elective	A minimum of 08

8.2   A candidate can enroll for a maximum of 24 credits per semester.

8.3 Only such candidates who register for a minimum of 18 credits per semester and complete successfully 76 credits in 4 successive semesters shall be considered for declaration of ranks, medals and are eligible to apply for student fellowship, scholarship, free ships and hostel facilities.

9. Continuous Assessment, Earning of Credits and Award of Grades

The evaluation of the candidate shall be based on continuous assessment. The structure for evaluation is as follows:

9.1 Assessment and evaluation processes happen in a continuous mode. However, for reporting purposes, a semester is divided into 3 distinct components identified as C_1, C_2, and C_3

9.2 The performance of a candidate in a paper will be assessed for a maximum of 100 marks as explained below.

   a) The first component (C1) of assessment is for 15 marks. This will be based on test, assignment, seminar and attendance (Class Participation).During the first half of the semester, the first 50% of the syllabus will be completed. This shall be consolidated during the 8th week of the semester. Beyond 8th week, making changes in C1 is not permitted. The marks for the class participation - 91-100 %: 05 marks, 81-90%: 04 marks and 75-80% :03 marks.

   b) The second component (C_2) of assessment is for 15 marks. This will be based on test, assignment, seminar and attendance (Class Participation). The continuous assessment and scores of second half of the semester will be consolidated during the 16th week of the semester. During the second half of the semester, the remaining units in the paper will be completed. The marks for the class participation- 91-100 % -05 marks, 81-90% 04 marks and 75-80% -03 marks

   c) The outline for continuous assessment activities for Component – I (C_1) and Component – II (C_2) will be proposed by the teacher(s) concerned before the commencement of the semester and will be discussed and decided in the respective Departmental Council. The students should be informed about the modalities well in advance. The evaluated papers / assignments during component - I (C_1) and component - II (C_2) of assessment are immediately returned to the candidates after obtaining acknowledgement in the register maintained by the concerned teacher for this purpose.

   d) During the 18th – 20th week of the semester, a semester end examination of 2 hours duration shall be conducted for each paper. This forms the third/final component of assessment (C_3) and the maximum marks for the final component will be 70.

10. Setting Question Papers and Evaluation of Answer Scripts.

   a) Question papers in three sets shall be set one by the internal and two by the external examiners. While selecting the examiners the University Guidelines are to be followed. Whenever there are no sufficient internal examiners, the Chairman of Board of Examination [BOE] shall get the question papers set by external examiners.

   b) The Board of Examiners shall scrutinize and approve the question papers and scheme of valuation.

   c) There shall be single valuation for all theory papers by external examiners. A detailed scheme of valuation to be prepared by the department and to be provided to the external examiner along with the answer scripts

d) The examination for Practical Work / Field Work / Project Work will be conducted jointly by internal and external examiners. However, the BOE on its discretion can also permit two internal examiners from the College.

e) If a paper is full of (L = 0): T: (P=0) type, then the examination for C_3 component will be as decided by the BOS concerned.

f) The details of continuous assessment are summarized in the following Table

Component	Syllabus in a paper	Weightage	Period of continuous assessment
C_1	First 50% of the Syllabus	15%	First half of the semester To be consolidated by 8th week
C_2	Remaining 50% of the Syllabus	15%	Second half of the semester To be consolidated by 16th week
C_3	Semester-end examination (all units of the paper)	70%	To be completed during $18^{th} – 20^{th}$ Week
Final grades to be announced latest by 24th week			

g) A candidate's performance from all 3 components will be in terms of scores, and the sum of all three scores will be for a maximum of 100 marks (15 + 15 + 70).

h) **Finally, awarding the grades should be completed latest by 24th week of the Semester.**

11. Minor / Major Project Evaluation

Right from the initial stage of defining the problem, the candidate has to submit the progress reports periodically and also present his / her progress in the form of seminars in addition to the regular discussion with the guide. Components of evaluation are as follows:

Component – I(C_1): Periodic Progress and Progress Reports (50)

Component – II (C_2): Results of Work and Draft Report (50)

Component – III(C_3): Final Viva Voce and evaluation (300). The report evaluation is for 100 and the Viva – voce examination is for 200.

12. In case a candidate secures less than 30% in C_1 and C_2 put together in a paper, the candidate is said to have **DROPPED** that paper, and such a candidate is not allowed to appear for C_3 in that paper.

In case a candidate's class attendance in a paper is less that 75% or as stipulated by the College, the candidate is said to have **DROPPED** that paper, and such a candidate is not allowed to appear for C_3 in that paper.

Teachers offering the papers will place the above details in the P G Department Council meeting during the last week of the semester, before the commencement of C_3 and subsequently a notification pertaining to the above

will be brought out by the Principal before the commencement of C_3 examination. A copy of this notification shall also be sent to the office of the Controller of Examinations.

12.1   In case a candidate secures less than 30% in C_3 he/she may choose **DROP/MAKEUP** option.

In case a candidate secures more than or equal to 30% in C_3 but his/her grade (G) = 4, as per section 12.5 below, then he/she may be declared to have been conditionally successful in that paper, provided that such a benefit of conditional clearance based on G = 4 shall not be availed for a maximum of **8credits** for the entire programme of Master's Degree of two years.

A candidate exercising his/her option to MAKEUP examination shall be declared passes if he/she secures more than or equal to 30% in C_3 provided he/she fulfils the conditions mentioned in the Para 12.1 & 12.5. To a candidate who does not pass in MAKE UP examination, no separate MAKEUP examination shall be conducted. Such a candidate has to appear for the examination as and when the C_3 component examination is conducted for Odd & Even semester of that academic year along with the regular candidates.

12.2   A candidate has to re-register for the DROPPED paper when the paper is offered again by the department if it is a hard core paper. The candidate may choose the same or an alternate core/elective in case the dropped paper is soft core/ elective paper. A candidate who is said to have DROPPED project work has to re-register for the same subsequently within the stipulated period. **The details of any dropped paper will not appear in the grade card.**

12.3   The tentative / provisional grade card will be issued by the Registrar (Evaluation) at the end of every semester indicating the papers completed successfully. This statement will not contain the list of DROPPED papers.

12.4   Upon successful completion of Master's degree a final grade card consisting of grades of all papers successfully completed by the candidate will be issued by the Registrar (Evaluation).

12.5   The Grade (G) and the Grade Point (GP) earned by the candidate in the subject will be as given below.

P	G	GP = V x G
90 – 100	10	V x 10
80 – 89.99	9	V x 9
70 – 79.99	8	V x 8
60 – 69.99	7	V x 7
50 – 59.99	6	V x 6
40 – 49.99	5	V x 5
30 – 39.99	4	V x 4
00 – 29.99	0	V x 0

Here, P is the percentage of marks P= $[(C_1+C_2) + C_3]$ secured by a candidate in a paper which is rounded to nearest integer. V is the credit value of paper. G is the Grade and GP is the Grade Point.

12.6   A candidate can withdraw any paper within ten days from the date of notification of final results of that semester. Whenever a candidate withdraws a paper, he/she has to register for the same paper in case it is hard core paper, the same paper or an alternate paper if it is soft core/open elective.

A DROPPED paper is automatically considered as a paper withdrawn.

12.7   The Semester Grade Point Average (SGPA) of a candidate after successful completion the required number of credits (76) is given by

$$\textbf{SGPA} = \frac{\sum GP}{Total\ number\ of\ credits}$$

12.8   The Final Semester Grade Point Average (SGPA) of a candidate after successful completion the required number of credits (76) is given by

$$\textbf{CGPA} = \frac{\sum GP\ of\ all\ the\ four\ Semesters}{\sum\ Credits\ of\ all\ the\ Semesters}$$

13.   Classification of results

The Final Cumulative Grade Point (FGP) to be awarded to the student is based on CGPA secured by the candidate and is given as follows:

CGPA	FGP	
	Numerical Index	Qualitative Index
4< = CGPA < 5	5	SECOND CLASS
5< = CGPA < 6	6	SECOND CLASS
6< = CGPA < 7	7	FIRST CLASS
7< = CGPA < 8	8	FIRST CLASS
8< = CGPA < 9	9	DISTINCTION
9< = CGPA < 10	10	DISTINCTION

Overall percentage = 10 x CGPA or is said to be 50% in case CGPA < 5.

ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSURU
PG DEPARTMENT OF COMPUTER SCIENCE

VISION AND MISSION OF THE COLLEGE

VISION:
The college is guided by the visionary zeal of providing value- based education to everyone irrespective of religion, caste, creed or sex by which the character is formed, intellect is explained and one can stand on his/her feet**.**

MISSION:
To transform young men and women who come to learn not from books, but also from life and to share the experience of working and playing together, which inculcates life skills to become good citizens with integrity and discipline**.**

VISION AND MISSION OF THE DEPARTMENT

VISION:
To create the most conducive environment for quality academic and research oriented postgraduate education in computer science and prepare the students for a globalised technological society and orient them towards serving the society.

MISSION:
1. To create, share, and apply knowledge in Computer Science, including in interdisciplinary areas that extend the scope of Computer Science and benefit humanity.
2. To educate students to be successful, ethical, and effective problem solvers and life-long learners who will contribute positively to the economic well-being of our region and nation.
3. Educate students in the best practices of the field as well as integrate the latest research into the curriculum.
4. Providing a strong theoretical and practical background across the computer science discipline with an emphasis on software development.
5. To inculcate the spirit of innovative thinking among the students and prepare them to tackle complex challenges facing the world.

PO No.	Programme Educational Objectives (PEOs)
PEO-1	**PROFESSIONAL DEVELOPMENT** To train the students to acquire knowledge in their chosen programme and apply professionally and ethically with responsibility towards the need of the society
PEO-2	**CORE PROFICIENCY** To expertise the students to organize, understand, evaluate, and solve problems by providing hands on experience through modern tools necessary for practice.
PEO-3	**TECHNICAL ACCOMPLISHMENTS** To equip the students with the talent to interpret in core applications by building up a multi-disciplinary concept.
PEO-4	**PROFESSIONALISM** Inculcating professional behaviour, strong ethical values, innovative research capabilities and leadership abilities.
PEO-5	**LEARNING ENVIRONMENT** To provide quality learning experiences through effective classroom practices, active learning styles of teaching, and opportunities for meaningful interaction between students and faculty

Mapping of Mission of the department with Programme Educational Objectives

Mission	Programme Educational Objectives (PEOs)				
	PEOs-1	PEOs-2	PEOs-3	PEOs-4	PEOs-5
M1	✓			✓	✓
M2	✓	✓			
M3		✓	✓	✓	
M4		✓		✓	
M5	✓		✓		✓

PO No.	Programme Outcomes (POs) Upon completion of the Programme the student will be able -
PO-1	To apply knowledge of mathematics, science, technology and ability to design and conduct experiments, as well as to analyze and interpret data
PO-2	To design an application, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, ethical, and sustainability
PO-3	To provide an ability to function on multidisciplinary teams
PO-4	To identify, formulate, and solve problems
PO-5	To inculcate research culture leading to publication of review articles and research article from the projects.
PO-6	To understand the impact of technology solutions in global, economic, environmental, and societal context
PO-7	To use the techniques, skills, and modern technology tools.

PSO No.	Programme Specific Outcomes PSOs Upon completion of the Programme the student will acquire -
PSO-1	The ability to understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing model of problems.
PSO-2	The ability to identify, analyze the computing requirements of a problem and Solve them using computing principles.
PSO-3	The ability to use current techniques and tools necessary for complex computing practices.
PSO-4	The ability to develop and integrate effectively system based components into user environment.
PSO-5	The ability to recognize the need for and develop the ability to engage in continuous learning as a Computing professional.
PSO-6	The ability to apply the understanding of management principles with computing knowledge to manage the projects in multidisciplinary environments.
PSO-7	The ability to understand societal, environmental, health, legal, ethical issues within local and global contexts and the consequential responsibilities relevant to professional practice.
PSO-8	The ability to identify opportunities and use innovative ideas to create value and wealth for the betterment of the individual and society.
PSO-9	Knowledge to analyze, interpret the data and synthesis the information to derive valid conclusions using research methods.
PSO-10	Expertise in developing application with required domain knowledge.

Mapping of Programme Educational Objectives with Program Outcomes and Programme Specific outcomes

Programme Educational Objectives	Program Outcomes						
	PO-1	**PO-2**	**PO-3**	**PO-4**	**PO-5**	**PO-6**	**PO-7**
PEOs-1	✔	✔			✔	✔	
PEOs-2	✔		✔	✔			✔
PEOs-3		✔	✔	✔		✔	✔
PEOs-4	✔	✔		✔	✔		✔
PEOs-5		✔	✔		✔	✔	✔

Programme Educational Objectives	Program Specific Outcomes									
	PSO-1	**PSO-2**	**PSO-3**	**PSO-4**	**PSO-5**	**PSO-6**	**PSO-7**	**PSO-8**	**PSO-9**	**PSO-10**
PEOs-1	✔	✔				✔		✔	✔	
PEOs-2		✔	✔		✔		✔			✔
PEOs-3			✔	✔	✔	✔				
PEOs-4	✔	✔	✔				✔	✔	✔	✔
PEOs-5	✔					✔		✔		✔

Preamble

The M.Sc., Computer Science programme was started in the year 2014. The curriculum was first revised in the academic year 2016-17. The present revision is the second one. The zest of post-graduation programme is to provide high quality education and an intellectual stimulus for advanced study through effective teaching learning process. Higher education has to foster in students the spirit of robust learning and ethical research to pursue further studies at globally reputed institutions.

Computer Science is one of the rapidly-changing fields in Science and Technology areas. Therefore, updating the curriculum is an important process that must be done frequently. Moreover, the educational institutions must communicate well with the companies that employ their graduates to make sure that the curriculum is evolved to meet changing needs and fit the market requirement. As requirements change through changing business circumstances, the software that supports the business must also evolve and change. Therefore, keeping computer science curriculum up-to date and application oriented is one of the important steps for any department.

This curriculum for Master degree in Computer Science (2018-2019) conforms to outcome based teaching and learning process. The proposed curriculum is drafted on the basis of guidelines suggested by University Grants Commission and MOOCs. The concerns, needs and interests of students, teachers as well as societal expectations have been taken into consideration by introducing core courses, discipline specific electives courses, generic elective courses, ability enhancement courses and skill enhancement courses with special focus on technical, communication and subject specific skills through practical, research and other innovative transactional modes to develop their employability skills. On completion of the programme the student will have competency in communication skills, critical thinking, psychological skills, affective skills, problems-solving, analytical, reasoning, research, teamwork, digital literacy, leadership moral and ethical awareness.

Further, the curriculum framework defines specific learning course outcomes at the starting of each course with key words to map the course learning outcomes with programme specific outcomes and cognitive levels.

CHOICE BASED CREDIT SYSTEM
M.SC COMPUTER SCIENCE COURSE STRUCTURE & SYLLABUS
DURATION OF THE COURSE: TWO YEARS

Sl. No	Subject Code	QP Code	TITLE OF THE PAPERS	Type	L	T	P	Credits	Total Credits
			FIRST SEMESTER						
1.	A0210	56001	Operating System	HC	4	0	0	4	
2.	A0220	56002	Software Engineering	HC	4	0	0	4	
3.	AP210	**NA**	Practical- C & C++	HC	0	0	4	4	20+4 (OE)
			Any two of the following SC to be Chosen						
4.	A0310	56003	Data Structures with C	SC	4	0	0	4	
5.	A0320	56004	Problem Solving in C++	SC	4	0	0	4	
6.	A0330	56005	Data Communication	SC	4	0	0	4	
			SECOND SEMESTER						
7.	B0210	56101	Database Management System	HC	4	0	0	4	
8.	B0220	56102	Computer Networks	HC	4	0	0	4	
9.	BP210	**NA**	Practical - DBMS and Networks	HC	0	0	4	4	16+4 (OE)
			Any one of the following SC to be Chosen						
10.	B0310	56103	System Software	SC	4	0	0	4	
11.	B0320	56104	Data Warehousing and Data Mining	SC	3	1	0	4	
12.	B0540	96504	Computer Application in Business (Interdisciplinary with Commerce)	SC	3	0	1	4	
			THIRD SEMESTER						
13.	C0210	56201	Wireless Networking	HC	4	0	0	4	
14.	C0220	56202	Web Engineering	HC	4	0	0	4	
15.	CP210	**NA**	Practical –Web and Python Programming	HC	0	0	4	4	20
			Any two of the following SC to be Chosen						
16.	C0310	56203	Python Programming	SC	4	0	0	4	

17.	C0320	56204	Mobile Computing	SC	4	0	0	4	
18.	C0330	56205	Cloud Computing	SC	3	1	0	4	
19.	C0530	96553	Mathematical Computation(Interdisciplinary with Mathematics)	SC	3	0	1	4	
FOURTH SEMESTER									
27.	DP210	**NA**	Major Project	HC	0	4	6	10	18
28.	D0220	56301	Internet of Things in The Cloud	HC	4	0	0	4	
Any one of the following SC to be Chosen									
30.	D0310	56302	PHP Programming	SC	4	0	0	4	
31.	D0320	56303	Network Security	SC	4	0	0	4	
32.	D0330	56304	Big Data Analytics	SC	4	0	0	4	
Total Credits (HC:50+SC:24+ OE:8)									**82**
OE FOR OTHER DEPARTMENT									
	SEM								
33.	**I**		Internet Fundamentals	OE	4	0	0	4	
34.	**II**		Multimedia Technology	OE	4	0	0	4	
35.	**III**		Web Designing	OE	4	0	0	4	
HC= HARD CORE PAPER. SC= SOFT CORE PAPER. OE = OPEN ELECTIVE PAPER									

Course Title	**OPERATING SYSTEM**							
Course Type	Hard Core- Theory		Total Hours	48	Hours/ Week	04	Credits	04
Course Code	A0210	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To be aware of the evolution and fundamental principles of operating system, processes and their communication;
CO-2	To understand the various operating system components like process management and memory management;
CO-3	To know about file management and the distributed file system concepts in operating systems;
CO-4	To be aware of components of operating system with relevant case study.

Mapping of CLOs with PSOs &CDLs

Course Learning Outcomes (CLOs): The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course.For every course there may be 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes (CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Describe and explain the fundamental components of a computer operating system;	**PSO-1**	**Understand**
CLO-2	Define, discuss and explain the concepts such as scheduling, deadlocks, memory management, synchronization and file systems;	**PSO-1 PSO-2 PSO-3**	**Understand Analyse Evaluate**
Units	**Course Content/ Syllabus**		**Duration**
1.1	Types of operating systems, Operating systems structures *Keywords: Understanding operating system and different types of operating system*		**3Hrs**
1.2	Systems components, Operating system services, System calls, System programs *Keywords: Understanding components and services of operating system*		**3Hrs**
1.3	Process concept, Process scheduling, Operation on processes, Co-operating processes, Inter process communications *Keywords: Understanding process and inter process communication*		**3Hrs**
1.4	CPU scheduling: Scheduling criteria, Scheduling algorithms, Multiple processor scheduling *Keywords: Understanding different process scheduling algorithms*		**3Hrs**
2.1	Threads: Multi-threading models, Deadlock: Deadlock Characterization, prevention, detection, avoidance, Recovery from Deadlock		**6Hrs**

		Keywords: Understanding deadlock	
2.2	Synchronization, Critical section problem, Semaphores, Classical problems of synchronization (Dinning Philosopher's problem, Bounded buffer problem, Reader's-Writers problem) *Keywords: Understanding synchronization and the concept of semaphores*		**6Hrs**
3.1	Swapping, Contiguous Memory allocation, Paging-Segmentation *Keywords: Understanding the concept of paging*		**6Hrs**
3.2	Virtual Memory, Demand paging, Page Replacement, Thrashing *Keywords: Learning different page replacement algorithms*		**6Hrs**
4.1	**Disk Structures:** Disk Scheduling, Free Space management, Distributed File systems, Naming and Transparency *Keywords: Understanding Disk structure and different disk scheduling algorithms*		**4Hrs**
4.2	**File Systems Interface:** File concepts, Access methods, Directory Structures. File System Implementation, File Systems structures, Directory Implementation *Keywords: Understanding file concepts*		**4Hrs**
4.3	Remote File Accesses, Stateful Versus Stateless Service, File replication *Keywords: Understanding remote file access*		**4Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Publisher	Edition	Year of publication
1	Operating Systems Concepts	Abraham Silberschalz Peter B Galvin, G.Gagne,	Addision Wesley Publishing Co.	7th	2010
2	Modern operating Systems	Andrew S.Tanenbaum,	PHI Learning Pvt.Ltd.	3rd	2008
3	Operating Systems: Internals and Design Principles	William Stallings	Prentice Hall	7th	2011
4	Operating Systems	H M Deital, P J Deital and D R Choffnes,	Pearson Education	3rd	2011
5	Operating Systems: A Concept-based Approach.	D M Dhamdhere	Tata McGraw-Hill Education	2nd	2007

Course Title	SOFTWARE ENGINEERING							
Course Type	Hard Core- Theory		Total Hours	64	Hours/Week	04	Credits	04
Course Code	A0220	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives On completion of the course the student will be able
CO-1	To understand an insight into the processes of software development
CO-2	To understand and practice the various fields such as analysis, design, development, testing of Software Engineering
CO-3	To develop skills to construct software of high quality with high reliability
CO-4	To apply metrics and testing techniques to evaluate the software

Mapping of CLOs with PSOs &CDLs

Course Learning Outcomes(CLOs): The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there maybe 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction and deployment	**PSO-1, PSO-2, PSO-3, PSO-4, PSO-11**	**Understand Apply**
CLO-2	Work as an individual and as part of a multidisciplinary team to develop and deliver quality software	**PSO-5, PSO-6, PSO-7**	**Evaluate Create**

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION TO SOFTWARE ENGINEERING:** FAQs, importance, diversities and ethics of software engineering *Key words- Understanding the concept of Software Engineering*	**06Hrs**
1.1	**PROCESS MODELS:** The system engineering process, process models, process activities and coping with change *Key words- Understanding and analysing different process models*	**06Hrs**
2.0	**REQUIREMENT ENGINEERING:** Functional and Non-functional requirements, s/w requirements document, requirements specification, requirements engineering processes, requirements elicitation, analysis, validation and management *Key words- Analysis and evaluation of RE*	**06Hrs**
2.1	**SYSTEM MODELING**: Context models, interaction models, structural models and	**03Hrs**

	behavioural models *Key words- Understanding and Analyzing different system models*	
2.2	**DESIGN AND IMPLEMENTATION:** Object oriented design, function oriented design, detailed design, User interface design: Principles, User interaction, Information presentation, User support *Key words- understanding the importance of design phase and analysis of implementation methods*	**03Hrs**
3.0	**CODING :** Coding and metrics(design level and coding metrics), Verification and Validation planning, clean room software development *Key words- Analyzing coding phase of the software engineering*	**06Hrs**
3.1	**SOFTWARE TESTING:** testing fundamentals, black box and white box testing, testing process and metrics *Key words- analyzing different software testing techniques*	**06Hrs**
4.0	**PROJECT MANAGEMENT**: Risk management, managing people and team work *Key words- Analysis of different project management techniques*	**06Hrs**
4.1	**PROJECT PLANNING**: S/w pricing, plan driven development, project scheduling, agile planning, estimation techniques, S/w reengineering, quality management *Key words- Analysis of the overall project planning*	**06Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Software Engineering	Ian Sommerville	9th	2001
2	Software Engineering A practitioners approach	Roger S. Pressman, Tata-McGraw Hill	5th	2015
3	Software Engineering, A precise approach	Pankaj Jalote	5th	2010

FIRST YEAR - SEMESTER – I

Course Title	C and C++ PRACTICAL							
Course Type	Hard Core- Practical		Total Hours	48	Hours/Week	04	Credits	04
Course Code	AP210	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To learn problem solving techniques
CO-2	To write programs in C and to solve the problems
CO-3	To identify and practice object=oriented programming concepts and techniques
CO-4	To practice the use of C++ classes and class libraries, arrays, inheritance and file operations

Mapping of CLOs with PSOs &CDLs

CourseLearningOutcomes(CLOs): The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statementsare prepared byc onsidering the course content covered in each unit of a course. For every course there maybe 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Read, understand and trace the execution of programs written in C.	PSO-2	Analyze
CLO-2	Implement programs with pointers and arrays	PSO-4	Create
CLO-3	Write programs that perform operations using derived data types	PSO-6	Create
CLO-4	Implement object oriented programming concepts in C++	PSO-8	Create
CLO-5	Implement object oriented programs using templates and exception handling concept	PSO-7	Create

Units	Course Content/ Syllabus	Duration
	PART A – C PROGRAMMING	
1.0	Algorithms, flowcharts, tokens, conditional statements, decision making, looping *Keywords: Implementation of the basic C programming*	**08Hrs.**
2.0	Sorting and searching algorithms *Keywords: Implementation of different sorting and searching techniques in C*	**08Hrs**
3.0	Implementing matrices, arrays, linked lists, stacks and queues *Keywords: Implementation of different data structures using C*	**08Hrs**
	PART B – C++ PROGRAMMING	

4.0	Programs on classes, objects, constructors, destructors *Keywords: Implementation of OOPs concept in C++*	**08Hrs**
5.0	Programs on operator overloading, function overloading, friend function, virtual function *Keywords: Implementation of polymorphism concept in C++*	**08Hrs**
6.0	Programs on inheritance, exception handling and files *Keywords: Implementing inheritance and exception handling programs*	**08Hrs**

Course Title	**DATA STRUCTURES WITH C**							
Course Type	Hard Core- Theory		Total Hours	80	Hours/Week	05	Credits	04
Course Code	A0310	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

<table>
<tr><th colspan="4" align="center">COURSE OBJECTIVES (COs)</th></tr>
<tr><td>CO No.</td><td colspan="3">Course Objectives
On completion of the course the student will be able</td></tr>
<tr><td>CO-1</td><td colspan="3">To understand the linear and non-linear data structures available in solving problems</td></tr>
<tr><td>CO-2</td><td colspan="3">To know about the sorting and searching techniques and its efficiencies</td></tr>
<tr><td>CO-3</td><td colspan="3">To know how to use data structures in real time applications.</td></tr>
</table>

Mapping of CLOs with PSOs &CDLs

CourseLearningOutcomes(CLOs): The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statement sare prepared by considering the course content covered in each unit of a course. For every course there maybe 5or more CLOs.**The keywords are used at the end of each unit todefineCLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Develop knowledge of linear data structures which includes arrays, linked lists, stacks and queue	PSO-1	Understand
CLO-2	Develop knowledge of non-linear data structures which includes trees, heaps and graphs	PSO-5	Analyze
CLO-3	Develop knowledge on hashing and file organization.	PSO-5	Analyze

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION TO DATA STRUCTURES:** Concept of data type**,** Definition of data structure, Types of data structures**.** *Key words- Understanding the concept and objectives of the Data structures*	**08 Hrs.**
1.1	**Arrays:** Representation, processing single and multidimensional arrays, operations on arrays *Key words- Understanding the concept of arrays and analyzing different operations on arrays*	**12Hrs**
2.0	**LINEAR DATA STRUCTURE: Stacks:** definition, representation of a stack in memory, operations on stack, multiple stacks, application of stacks *Key words- Understanding stacks, analyzing operation on stacks, application of stacks*	**08Hrs**

2.1	**Queue:** definition, representation of a queue in memory, operations on queues, types – linear, circular, dequeue, priority queue, applications of queue *Key words- Understanding queues, analyzing operation on queues, application of queues*	**06Hrs**
2.2	**Linked list:** definition, representation of a linked list in memory, operations on linked list *Key words- Understanding linked list, analyzing representation and operation on linked list, application of stacks*	**06Hrs**
3.0	**NON-LINEAR DATASTRUCTURE: Trees:** Types - Binary tree, Binary search tree, AVL tree, Btree, B+-tree *Key words- Understanding non-linear DS, analyzing the concept of Trees.*	**12Hrs**
3.1	**Heaps and Graphs** Introduction to heaps, graphs. *Key words- Analyzing the concept of heaps and graphs, evaluating algorithms on heaps and graphs*	**08Hrs**
4.0	**HASHING: Hashing and hash tables:** Definition, Hash functions, Types of hash functions, Rehashing *Key words-Analyzing and creating hash tables*	**6Hrs**
4.1	**Files:** Definition, Basic terminologies, Attributes of a file, Classification of files, Operations on files *Key words-Understanding files*	**8Hrs**
4.2	**Types of file organization:** sequential, relative, indexed and multi-key file organizations *Key words- Understanding and evaluating file structure*	**6Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Data Structures: A Pseudocode Approach with C	Richard Gilberg, Behrouz A. Forouzan	2nd	2004
2	Data Structures Using C and C++	YedidyahLangsam, Aaron M. Tenenbaum	2nd	2015
3	Fundamentals Of Data Structures	Ellis Horowitz &SartajSahni	2nd	2008

Course Title	**PROBLEM SOLVING IN C++**							
Course Type	Hard Core- Theory		Total Hours	48	Hours/Week	04	Credits	04
Course Code	**A0320**	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To learn how C++ supports Object Oriented principles such as abstraction, polymorphism etc;
CO-2	To understand and apply the principles hiding, localization and modularity in software development
CO-3	Use the generic programming features of C++ including the STL;
CO-4	Design and implement reliable and maintainable object-oriented applications of moderate complexity composed of several classes.

Mapping of CLOs with PSOs &CDLs

CourseLearningOutcomes(CLOs): The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statementsare prepared byc onsidering the course content covered in each unit of a course. For every course there maybe 5 or more CLOs. **The keywords are used at the end of each unit to defineCLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	The basic components of an object oriented program	PSO-1	Understand
CLO-2	The concepts of methods and attributes, distinction between classes and instances;	PSO-2	Analyze
CLO-3	The concepts of inheritance, constructors and destructors, virtual functions	PSO-3	Analyze

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION :** Program development life cycle, program designing tools structure charts, algorithms, flowchart, decision table, pseudo-codes, coding *Key words- Understanding the basic concepts of programming*	**02Hrs.**
1.1	**Flow charts:** Symbols used in flowchart, chart levels of flowchart, rules for drawing the flow chart, advantages and limitations of flowchart *Key words – Analysis of the flowchart*	**03Hrs**
1.2	**Algorithm:** Definition, areas of algorithm study, performance analysis, space complexity, time complexity *Key words: Analysis of the concept of algorithms*	**03Hrs**
1.3	**Asymptotic notations:** Big Oh, big omega, little Oh, little omega and theta notations *Key words: evaluation of the algorithms*	**02Hrs**

1.4	**Decision Tables and Pseudo-codes:** Definition, advantages and disadvantages *Key words: Understanding decision tables and pseudo code*	**02Hrs**
2.0	**INTRODUCTION TO C++:** Programming approaches: Procedure-oriented programming, concepts of Object-oriented programming **Structure of C++ program**: Fundamentals, tokens, data types-basic, user defined and derived; symbolic constants, type compatibility *Key words: Understanding OOPs concept*	**04Hrs**
2.1	**Basic Concepts:** Declaration of variables, Dynamic initialization of variables, Reference variables, Operators in C++, Scope resolution operator, Member dereferencing operators, Memory management operators, Manipulators, Type cast operator, Expressions and their types, Special assignment expressions, Implicit conversions, operator overloading, operator precedence, control structures *Keywords: Understanding basics concepts of C++*	**04Hrs**
2.2	**Functions:** The main function, function prototyping, inline functions, call by Reference, return by reference, Default arguments, const arguments, function overloading, friend and virtual functions *Keywords: Understanding the concept of functions*	**04Hrs**
3.0	**CLASSES AND OBJECTS:** Classes and objects, constructors and destructors, operator overloading and type conversions, inheritance *Keywords: Analysing classes and objects in C++*	**12Hrs**
4.0	**EXCEPTION HANDLING, FILES AND TEMPLATES:** Virtual Functions, Console I/O Operations, Files, Templates, Exception Handling *Keywords: Understanding error handling and file management in C++*	**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	OOPS and C++	Robert Lafore	4th	2001
2	Teach yourself C++	Al Stevens	6th	2000
3	C++ Primer	Stanley B Lippman	5th	2012

FIRST YEAR – SEMESTER - I

Course Title	DATA COMMUNICATIONS						
Course Type	Soft Core- Theory		Total Hours	64	Hours/Week	04	Credits	04
Course Code	A0330	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able to
CO-1	learn and develop basic skills in networking and know the modes of communications
CO-2	Describe the way network is built and to analyse the types of networks and algorithms

Mapping of CLOs with PSOs &CDLs			
CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Identify different components and their respective roles in a computer communication system	**PSO-1 & PSO-2**	**Analyse**
CLO-2	Apply the knowledge, concepts and terms related to data communication and networking	**PSO-6 & PSO-7**	**Analyse Evaluate**
CLO-3	Solve problems in networking by referring to problems solving steps through relevant information by choosing suitable techniques	**PSO-4 & PSO-5**	**Analyse Apply Evaluate**
CLO-4	Acquaint them with networking software simulation tools, configuring of networking devices and understand their functionality	**PSO-6**	**Analyse**
CLO-5	know the strategies for securing network applications	**PSO-7**	**Evaluate**
CLO-6	Appreciate usefulness and importance of computer communication in today life and society	**PSO-1**	**Understand**

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION** Data Communications, A communication Model, Data Representation, Networks, Protocols and Standards, TCP/IP Protocol Suite, OSI Model, Signals, Data rate limits, Impairments *Keywords: Understanding Data transfer*	**12Hrs**
2.0	**DIGITAL TRANSMISSION** Digital transmission, Modes of transmission, Analog transmission, Telephone modems, Multiplexing, Transmission media, Circuit Switching, Error Detection and Correction, Data Link Control and Protocols *Keyword: understanding different methods of data transfer*	**12Hrs**
3.0	**SWITCHING AND ROUTING**HDLC, Multiple Access, Connecting Devices, Virtual Circuit Switching, Frame Relay, ATM, Addressing, Routing, Network Layer Design Issues, Implementation of Connectionless and Connection Oriented Service *Keyword: Analyzing different switching and routing methods*	**12Hrs**

4.0	**ROUTING ALGORITHMS** Routing Algorithms, Shortest Path Routing, General Principles of Congestion Control, Congestion Prevention Policies, Transport Service Primitives, Berkeley Sockets, Elements of Transport Protocols *Keyword: Analyzing different routing methods*	**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Publisher	Year of Publication
1	Data communication and network	Behrouz A Forouzan	Tata McGraw Hill	2001
2	Communication Networks – Fundamental Concepts and Key architectures	Alberto Leon Gracia and IndraWidjaja	Tata McGraw Hill	2004
3	Data Communications and Networks	Achyut S Godbole	Tata McGraw Hill	2002

Course Title	DATABASE MANAGEMENT SYSTEM						
Course Type	Hard Core- Theory		Total Hours	48	Hours/Week	04	Credits	04
Course Code	B0210	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives On completion of the course the student will be able
CO-1	To understand the fundamentals of data models and depict a database system using ER diagram;
CO-2	To make a study of SQL and relational database design;
CO-3	To know about data storage techniques and query processing;
CO-4	To impart knowledge in transaction processing, concurrency control techniques and recovery procedures;

Mapping of CLOs with PSOs &CDLs

Course Learning Outcomes (CLOs): The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course.For every course there may be 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes (CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Understand the database concepts and models	PSO-1	Understand
CLO-2	Design a database using ER diagrams and map ER into relations and normalize the relations	PSO-1 PSO-3	Apply Create Evaluate
CLO-3	Write SQL commands.	PSO-1 PSO-4 PSO-5	Apply Create

Units	Course Content/ Syllabus	Duration
1.1	A historical perspective File system versus a DBMS, Advantage of a DBMS, Levels of abstraction in a DBMS, Structure of a DBMS, People who work with databases, An example of database application *Keywords: Understanding the concept of database and DBMS*	**6Hrs**
1.2	Attributes and Entities: Entity types, Entity sets, Attributes and keys, Relationships and relationship sets, additional features of ER-model-key constraints, participation constraints, weak entities *Keywords: Understanding different types of keys, ER model and constraints*	**6Hrs**
2.1	Relational constraints and relational database schemas, basic relational algebra operations, additional relational operations, examples of queries in relational algebra. *Keywords: Understanding relational algebra operations*	**6Hrs**
2.2	Data definition, constraints and schema changes in SQL, basic queries in SQL,	**6Hrs**

	insert, delete and update statements in SQL, views in SQL **Keywords: Learning SQL commands**	
3.1	Informal design guidelines for relational schemas, functional dependencies, normal forms, general definitions of second and third normal forms, Boyce-codd normal forms. **Keywords: Understanding the concept of normalization and different normal forms**	**4Hrs**
3.2	File organization and indexing, clustered indexes primary and secondary indexes, index data structures, hash based indexing, tree-based indexing, comparison of file organizations. **Keywords: Understanding file organization and different types of indexing**	**3Hrs**
4.1	The ACID properties: Consistency and isolation, atomicity and durability. **Keywords: understanding transaction and properties of transaction**	**2Hrs**
4.2	Transaction on schedules, concurrent execution of transactions, motivation of concurrent execution, serializability, anomalies due to interleaved execution. **Keywords: understanding the concept of concurrent execution and serializability**	**4Hrs**
4.3	Lock based concurrency control, Strict two face locking, Performance of locking. **Keywords: Learning and analysing different locking protocols**	**2Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Publisher	Edition	Year of publication
1	Database system concepts	AbrahamSilberschatz Henry F.KorthS.Sudarshan,	McGraw-Hill Publications	6th	2011
2	Database management systems	Alexis Leon Mathews Leon	Vikas Publications House	1st	2002
3	Database system: Apractical approach to design, implementation and management:	Thomas Connolly Carolyn E. Begg	Pearson Education,India	4th	2014

RECOMMENDED BOOKS					
1	Database management systems	Raghu Ramakrishnan and JohneesGehrke,	McGraw-Hill,	3rd	2003
2	Fundamental of database systems,	RamezElmasri ShamkanthB.Navathe	Addison Wesley Pearson education	3rd	2000

FIRST YEAR - SEMESTER – II

Course Title	**COMPUTER NETWORKS**							
Course Type	Hard Core- Theory		Total Hours	80	Hours/Week	04	Credits	04
Course Code	B0220	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives On completion of the course the student will be able
CO-1	To understand networking concepts and basic communication model;
CO-2	To understand network architectures and components required for data communication;
CO-3	To analyze the function and design strategy of physical, data link, network layer and transport layer;
CO-3	To acquire knowledge of various application protocol standard developed for internet.

Mapping of CLOs with PSOs &CDLs

CourseLearningOutcomes(CLOs):The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there maybe 5 or more CLOs. **The keywords are used at the end of each unit to defineCLOs.**

CLOs No.	Course Learning Outcomes(CLOs) **On completion of the course the student will learn to**	PSOs Addressed	CLDs
CLO-1	Identify the components required to build different types of networks;	**PSO-1**	**Understand**
CLO-2	Understand the functionalities needed for data communication into layers;	**PSO-1**	**Understand**
CLO-3	Understand the working principles of various application protocols and acquire knowledge about security issues and services available.	**PSO-1**	**Understand**

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION :**Uses of networks, categories of networks, communication model, data transmission concepts and terminology, protocol architecture, OSI & TCP/IP, LAN topology, transmission media *Key words- Understanding the concept and objectives of networking*	**04 Hrs.**

1.1	**DATA LINK LAYER:** Data link control, Flow Control, Error Detection and Error Correction, MAC, Ethernet, Token ring, Wireless LAN MAC, Bluetooth, Bridges *Key words-understanding how data link layer makes data error free and along with frame formats*	**08 Hrs.**
2.0	**NETWORK LAYER:** Switching concepts, Circuit switching, Packet switching, IP– Datagrams, IP addresses, IPV6, ICMP, Routing Protocols, Distance Vector, Link State- BGP *Key words-understanding switching concepts used in routing protocols along with addressing modes*	**12 Hrs.**
3.0	**TRANSPORT LAYER:** Transport layer, service, connection establishment, flow control, transmission control protocol, congestion control and avoidance User datagram protocol, Transport for Real Time Applications (RTP) *Key words- understanding the services provided by transport layer along with protocols*	**12 Hrs.**
4.0	**APPLICATION LAYER:** DNS, SMTP, WWW, SNMP, Security, Threats and services, DES, RSA, web security, SSL *Key words- Understanding Different protocols in application layer and different types of security*	**12 Hrs.**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Computer Networks – A systems Approach.	Larry L. Peterson & Bruce S. Davie	4TH	2007
2	Data and Computer Communications	William Stallings	9TH	2011
3	Data Communication and Networking	Forouzan	5TH	2012
4	Computer Networks	Andrew S.Tannenbaum David J. Wetherall,	5TH	2011
5	Computer Networking	James F. Kurose, Keith W. Ross	6TH	2012
6	Communications and Networking: An Introduction	John Cowley	1ST	2010
7	Data Communications and Networks	Achyut S Godbole,AtulHahate	6TH	2011
8	Introduction to Data communications and Networking.	Wayne Tomasi,	1ST	2011

FIRST YEAR - SEMESTER –II

Course Title	DBMS and NETWORKS PRACTICAL						
Course Type	Soft Core- Theory		Total Hours	32	Hours/Week	04	Credits	04
Course Code	BP210	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To understand and apply different queries and fundamentals of networks
CO-2	To manage networks efficiently

Mapping of CLOs with PSOs &CDLs

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Implement real time queries	PSO-4	Apply
CLO-2	Learn how to manage a network	PSO-1	Understanding

Units	Course Content/ Syllabus	Duration
1.0	**PART A: DBMS** Structured Query Language , ER diagrams *Keyword: understanding basic of DBMS*	**6Hrs**
1.1	Data Manipulation Language ,Data Definition Language , Data Control Language *Keyword: understanding DML,DDL and DCL*	**6Hrs**
1.2	Creation of table, insertion, deletion, updating statement *Keyword: understanding transactions in DBMS*	**6Hrs**
1.3	Concurrent processing ,Normalization ,File organization *Keyword: understanding normal forms*	**6Hrs**
2.0	**PART B: NETWORKS** Installing and configuring windows server, cable crimping using color codes *Keyword: learning basics of networks*	**4Hrs**
2.1	Installation and configuring peer to peer and server client network, active directory services, DNS and DHCP services, FTP, HTTP services *Keyword: understanding protocols*	**4Hrs**
2.2	Backup and restoration for ADS,DHCP and user data, FAT and NTFS shading permission *Keyword: understanding how to backup and restore*	**4Hrs**
2.3	Configuring and implementing unmanageable network switch, manageable network switch, local security and domain security policies *Keyword: learning how to configure a network*	**4Hrs**
2.4	Installing printer in server, configuring gate ways services, wireless access point, wired, wireless and Ad-hoc wireless network *Keyword: understanding wireless networks*	**4Hrs**
2.5	Installation and configuration of different antivirus software and admin console, remote desktop, remote assistance, telnet, hyper terminal, team viewer	**4Hrs**

	Keyword:l earning about viruses	

FIRST YEAR - SEMESTER – II

Course Title	**SYSTEM SOFTWARE**						
Course Type	Soft Core- Theory	Total Hours	48	Hours/Week	04	Credits	04
Course Code	B0310	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To understand the relationship between system software and machine architecture, design and implementation of assemblers, linkers and loaders
CO-2	To understand the design, function and implementation of assemblers, linkers and loaders;
CO-3	To have an understanding of macro processors and system software tools

Mapping of CLOs with PSOs &CDLs

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Trace the path of a source code to object code and to executable file	**PSO-4**	Apply
CLO-2	Understand and identify the relationship between system software architecture and to analyze assembler, compiler, linker and loaders.	**PSO-1**	Understanding

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION TO SYSTEM SOFTWARE:** System programs, assembler, compiler, interpreter, operating system, machine structure instruction set and addressing modes *Keywords: Analysis of interpreter, machine instructions*	**12Hrs**
2.0	**ASSEMBLER FUNCTIONS:** Basic assembler functions, machine dependent and machine independent assembler features *Keywords: Analysis of assembler*	**06Hrs**
2.1	**ASSEMBLER DESIGN**: two-pass assembler with overlay structure, one pass assembler and multi - pass assembler *Keywords: Analysis of assembler deign*	**06Hrs**
3.0	**LOADER FUNCTIONS:** Basic loader functions, machine dependent and machine independent loader features, loader design, linkage editors, dynamic linking and bootstrap loaders *Keywords: Analysis of loader*	**06Hrs**
3.1	Basic macro processor functions machine independent features, macro processor design recursive, one pass macro processor, two pass macro processor, general-purpose and macro processing with language translators *Keywords: Analysis of macro processor*	**06Hrs**

4.0	**DEBBUGER:** Debugger architecture, H/W debugger facilities, OS debugger infrastructure, Controlling execution *Keywords: Understanding of debugger*	**05Hrs**
4.1	Breakpoints and single stepping, inspecting data and variables debugging GUI applications *Keywords: Analysis of debugging*	**07Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	System Software In introduction to System Programming	Leland L. Beck	3rd	1996
2	How Debuggers Work: Algorithms, Data Structures, and Architecture	Jonathan B. Rosenberg	1st	1996
3	Introduction to System Software	Damdhare	-	1987

FIRST YEAR - SEMESTER – II

Course Title	DATAWAREHOUSING AND DATA MINING						
Course Type	Hard Core- Theory		Total Hours	48	Hours/Week	04	Credits	04
Course Code	B0320	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives On completion of the course the student will be able
CO-1	To understand Data mining principles and techniques and introduce Data Mining as a cutting edge business intelligence
CO-2	To expose the students to the concepts of Data Warehousing Architecture and Implementation
CO-3	To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining
CO-4	To identify Business applications and Trends of Data mining

Mapping of CLOs with PSOs &CDLs

CourseLearningOutcomes(CLOs): The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statementsare prepared byc onsidering the course content covered in each unit of a course. For every course there maybe 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Evolve multidimensional intelligent model from typical system	PSO-1	Analyze
CLO-2	Discover the knowledge imbibed in the high dimensional system	PSO-5	Analyze
CLO-3	Evaluate various mining techniques on complex data objects.	PSO-7	Evaluate

Units	Course Content/ Syllabus	Duration
1.0	**DATA WAREHOUSING:** Operational database systems vs. Data warehouses, multidimensional data model, schemas for multidimensional databases, OLAP operations, data warehouse architecture, indexing, OLAP queries & tools *Keywords: Understanding the concept of data warehousing*	**06Hrs**
1.1	**KDD PROCESS**: Knowledge discovery from databases, need for data preprocessing, data cleaning, data integration and transformation, data reduction, data discretization and concept hierarchy generation *Keywords: Analysis of KDD process*	**06Hrs**

2.0	**DATA MINING:** Data mining functionalities, association rule mining, mining frequent item sets with and without candidate generation, mining various kinds of association rules, constraint based association mining *Keywords: Understanding the concept of data mining*	**12Hrs**
3.0	**CLASSIFICATION METHODS:** Data preparation for classification and prediction, classification by decision tree introduction, Bayesian classification, rule based classification, classification by back propagation, support vector machines *Keywords: Analysis of the different classification stages*	**06Hrs**
3.1	Associative classification, lazy learners, other classification methods, prediction, accuracy and error measures, evaluating the accuracy of a classifier or predictor, ensemble methods, model section *Keywords: understanding the method of classification*	**06Hrs**
4.0	**CLUSTER ANALYSIS:** Types of data in cluster analysis, major clustering methods: partitioning methods, hierarchical methods, density-based methods, grid-based methods, model-based clustering methods *Keywords: understanding different cluster analysis methods*	**06Hrs**
4.1	Clustering high - dimensional data, constraint based cluster analysis, outlier analysis *Keywords: Analysis of different cluster methods*	**06Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Data Warehousing, Data-Mining & OLAP"	Alex Berson, Stephen J. Smith	1st	2008
2	Data Warehousing: Architecture and Implementation	Mark Humphries, Michael W. Hawkins, Michelle C. Dy	-	2006
3	Data Mining: Introductory and Advanced Topics	Margaret H. Dunham, SSridhar	3rd	2001
4	Data Mining Concepts and Techniques	Jiawei Han and MichelineKamber	2nd	2008
5	Insight into Data mining Theory and Practice	K.P. Soman, ShyamDiwakar and V. Ajay	-	2006

Course Title	COMPUTER APPLICATION IN BUSINESS							
Course Type	Soft Core-Interdisciplinary-Theory		Total Hours	80	Hours/Week	05	Credits	04
Course Code	B0540	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)	
CO No.	**Course Objectives**
	On completion of the course the student will be able
CO-1	To understand basic operations of computer which is excel .
CO-2	To know how to use the software in business industry

Mapping of CLOs with PSOs &CDLs			
CLOs No.	**Course Learning Outcomes(CLOs)** **On completion of the course the student will learn to**	**PSOs Addressed**	**CLDs**
CLO-1	Solve problems using excel	**PSO-1 & PSO-2**	**Understand Analyse**
CLO-2	Identify formulas and understand macros and tally	**PSO-6 & PSO-7**	**Analyse Evaluate**
CLO-3	To understand strategic management and CRM,ERP	**PSO-4 & PSO-5**	**Analyse Apply Evaluate**

Units	Course Content/ Syllabus	Duration
1.1	**INTRODUCTION TO EXCEL:** data modelling in excel, power pivot, charts, working with functions, instant data analysis *Keywords-*understanding the fundamentals of EXCEL	**15Hrs**
1.2	**APPLICATIONS in financial management and taxation** using ms excel to solve financial management problems- present value, future value, npv etc. online trading of securities, online banking, filing of online application for pan and tan, online submission of income tax returns and tds return. e-filing of indirect taxes return *Key words-* implementing different functions in EXCEL	**15Hrs**
3.1	**ENTERPRISE RESOURCE PLANNING** meaning and importance erp and functional areas of management, marketing / sales- supply chain management, finance and accounting, human resources, types of reports and methods of report generation *keyword: understand ERP*	**12Hrs**

4.1	**APPLICATIONS IN FINANCIAL ACCOUNTING** Features of tally erp.9. setting up a new company and creating masters in tally.erp9. technological advantages of tally.erp9 *keyword: features of tally*	**12Hrs**
4.2	Preparation of project and ERP, meaning of project, project identification, project selection, project report, need and significance of report, contents formulation, guidelines by planning commission for project report *keyword: learn preparation of project and report*	**10Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of Publication
1	Tally. ERP 9 Essentials	Tally Solutions Pvt. Ltd.	-	2009
2	Excel: Quick Start Guide From Beginner to Expert	William Fischer	2nd	-
3	Building Financial Models with MS Excel A Guide for Business Professionals	K Scott Proctor	2nd edition, 2010.	-

Course Title	WIRELESS NETWORKING							
Course Type	Soft Core- Theory		Total Hours	48	Hours/Week	04	Credits	04
Course Code	C0210	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able to
CO-1	Understand some fundamental concepts in wireless networks
CO-2	Understand physical as wireless MAC layer alternatives techniques
CO-3	Learn planning and operation of wireless networks
CO-4	Study various wireless LAN and WAN concepts
CO-5	Study various wireless LAN and WAN concepts

Mapping of CLOs with PSOs &CDLs			
CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Describe the lower layer issues in wireless communication system	PSO-1 & PSO-2	Understand Analyze
CLO-2	Discuss the principles of mobile computing and its enabling technologies	PSO-6& PSO-7	Analyze Evaluate
CLO-3	Explain the problems and solutions introduced by wireless network and mobile computing to traditional networking, operating system, human computer interface, architecture and security	PSO-4 & PSO-5	Analyze Apply Evaluate

Units	Course Content/ Syllabus	Duration
1.0	**MULTIPLE RADIO ACCESS:** Medium access alternatives, fixed-assignment for voice oriented networks random access for data oriented networks, handoff and roaming support, security and privacy *Key words- Understanding and analyzing different radio access methods. Analyzing handoff and security in wireless networks.*	**12Hrs**
2.0	**WIRELESS TECHNOLOGY:** Wireless WANs, First Generation analog, Second Generation TDMA, GSM, Short Messaging Service in GSM, Second Generation CDMA – IS-95, GPRS - Third Generation Systems (WCDMA/CDMA 2000) *Key words- Understanding, analyzing and evaluating different wireless technology*	**06Hrs**

2.1	**WIRELESS LANs:** Introduction, IEEE 802.11 WLAN – Architecture and Services, Physical Layer- MAC sub layer- MAC Management Sub layer, HIPERLAN, WiMax. *Key words- Understanding WLAN*		**06Hrs**
3.0	**ADHOC AND SENSOR NETWORKS:** Protocols, characteristics of MANETs, table-driven and source-initiated on demand routing protocols, hybrid protocols, wireless sensor networks- classification, MAC and routing protocols *Key words- Understanding, analyzing and evaluating different protocols in AdHoc and sensor networks*		**12Hrs**
4.0	**WIRELESS MAN**S **AND PAN**S: Layer details: Wireless MANs – physical and MAC layer details, wireless PANs – architecture of Bluetooth systems, physical and MAC layer details, standards *Key words- Understanding and analyzing MANs and PANs*		**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Wireless Communications and networks	William Stallings	2nd	2007
2	Introduction to Wireless and Mobile Systems	Dharma PrakashAgrawal& Qing-AnZeng	2nd	2007

SECOND YEAR - SEMESTER – III

Course Title	**WEB ENGINEERING**						
Course Type	Soft Core- Theory	Total Hours	64	Hours/Week	04	Credits	04
Course Code	C0220	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)			
CO No.	**Course Objectives**		
	On completion of the course the student will be able		
CO-1	To understand the concepts, principles, strategies, and methodologies of Web applications and development. To apply current Web technologies to understand current Web business models, to understand and apply Web development processes.		
Mapping of CLOs with PSOs &CDLs			
CLOs No.	**Course Learning Outcomes (CLOs) On completion of the course the student will learn to**	**PSOs Addressed**	**CLDs**
CLO-1	Develop web applications and web services	**PSO-1 PSO-5**	**Understand Apply**
CLO-2	Develop user-interfaces.	**PSO-1 PSO-3**	**Understand Apply**

Units	Course Content/ Syllabus	Duration
1.1	Web applications, motivation, categories of web applications, characteristics of web applications, product related characteristics, usage related characteristics, development-related characteristic, evolution of web engineering. *Keywords: Understanding web applications and different categories of web applications*	**12 Hrs**
2.1	Introduction, fundamentals, where do requirements come from, requirements engineering activities re specifics in web engineering *Keywords: Learning requirement engineering*	**6Hrs**
2.2	Principles for RE of web applications, adapting re methods to web application development, requirement types, notations, tools *Keywords: Understanding requirement types and principles of RE*	**6Hrs**
3.1	The role of the information architect, collaboration and communication, organizing information, organizational challenges, organizing web sites and intranets *Keywords: Understanding the concept of information architecture*	**6Hrs**
3.2	Navigation systems, creating cohesive organization systems designing navigation systems, types of navigation systems, integrated navigation elements, remote navigation elements, designing elegant navigation systems *Keywords: Understanding different navigation systems.*	**6Hrs**

4.1	Searching Systems, searching your web site, designing the search interface, indexing the right stuff, to search or not to search, grouping content, conceptual design, high-level architecture blueprints, architectural page mockups, design sketches *Keywords: Understanding searching and indexing*	**6Hrs**
4.2	Web Project Management, understanding scope, refining framework activities, building a web E team, managing risk, developing a schedule, managing quality, managing change, tracking the project *Keywords: Understanding risk management and quality management*	**6Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Publisher	Edition	Year of publication
1	Web Engineering	GertiKappel, Birgit Proll	John Wiley and Sons Ltd,	-	2006
2	Web Engineering	Roger S.Pressman, David Lowe,	Tata McGraw Hill Publication	-	2007
3	Web Programming	Guy W. Lecky-Thompson	Cengage Learning.	-	-

RECOMMENDED BOOKS

1	An Introduction to XML and Web Technologies	Moller	Pearson Education New Delhi	-	2009
2	Web Programming: Building Internet Applications	Chris Bates	Wiley India Edition, 2007	3rd	2007
3	Web Development with Microsoft Visual Studio 2005", Wiley Dreamtech, 2006	John Paul Mueller	-	-	2006
4	CGI Programming with Perl 2/e	Scott Guelich, ShishirGundavaram, Gunther Birzniek	O'Reilly	2nd	2006
5	Programming Web Services with SOAP	Doug Tidwell, James Snell, PavelKulchenko	O' Reilly	1st	2002
6	XML in Action, Web Technology	Pardi	PHI	-	1999

SECOND YEAR - SEMESTER – III

Course Title	WEB AND PYTHON PROGRAMMING						
Course Type	Hard Core- Practical		Total Hours	48	Hours/Week	04	Credits	04
Course Code	CP210	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives On completion of the course the student will be able
CO-1	To understand and apply Web development processes.
CO-2	To Learn to create Functions, Handle Strings and Files in Python
CO-3	To understand Lists, Dictionaries and Regular expressions and to implement Object Oriented Programming concepts in Python;
CO-4	To build Web Services and to create Network and Database Programs using Python.

Mapping of CLOs with PSOs &CDLs

Course Learning Outcomes (CLOs): The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course.For every course there may be 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes (CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Develop web applications by applying mark up languages and to maintain web server services	**PSO-1 PSO-7 PSO-11**	**Understand Apply Create**
CLO-2	Examine Python syntax and semantics and be fluent in the use of Python flow control, functions ,Strings and file systems;	**PSO-1 PSO-4 PSO-7**	**Understand Apply Create**
CLO-3	Create, run and manipulate Python Programs using core data structures like Lists ,Dictionaries and use Regular Expressions	**PSO-4 PSO-7**	**Apply Create**
CLO-4	Interpret the concepts of Object-Oriented Programming as used in Python	**PSO-7 PSO-11**	**Apply Create**
CLO-5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.	**PSO-7**	**Create**

Units	Course Content/ Syllabus	Duration
	PART A – WEB PROGRAMMING	
1.0	Websites basics, client server architecture, peer to peer architecture *Keywords: Understanding architecture used in web programming*	**2Hrs**
2.0	Browser, webpages, http, TCP/IP, server, w3c *Keywords: Understanding the basic terminologies*	**2Hrs**
3.0	HTML: creating web pages using tags *Keywords: Learning to create webpages using basic html tags*	**2Hrs**
4.0	Creating forms, adding background, validating, redirecting, formatting, input	**3Hrs**

	attributes, tables, checkboxes, radio buttons, dropdown menus *Keywords: Learning to create forms and tables*	
5.0	HTML5: using new features of HTML5 such as images, videos, canvas, header, footer, article, section, date, time *Keywords: Learning the tags in HTML5*	**3Hrs**
6.0	CSS: styling web pages using inline, embedded and external CSS *Keywords: Understanding different types of style sheets*	**3Hrs**
7.0	Java script: using JS for validating and computing using functions, exception handling. *Keywords: Learning different java script programs*	**4Hrs**
8.0	Servlets: get, post actions, session handling and cookies *Keywords: Understanding servlets and its use*	**3Hrs**
9.0	Web2.0 *Keywords: Understanding Web 2.0*	**2Hrs**
PART B – PYTHON PROGRAMMING		
10.0	Interpreters, program execution, functions, strings *Keywords: Learning functions and strings*	**4Hrs**
11.0	Classes, objects, loops, exception *Keywords: Learning different types of loops and class concept*	**4Hrs**
12.0	List, tuples, dictionary *Keywords: Learning list ,tuples and dictionary*	**4Hrs**
13.0	Regular expressions *Keywords: Learning regular expressions.*	**4Hrs**
14.0	CGI programming, multi-threading, GUI programming *Keywords: Learning multithreading and CGI programming*	**4Hrs**
15.0	Network application programming, Data visualization *Keywords: Learning network application programming*	**4Hrs**

SECOND YEAR - SEMESTER –III

Course Title	**PYTHON PROGRAMMING**						
Course Type	Soft Core- Theory	Total Hours	80	Hours/Week	05	Credits	04
Course Code	C0310	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3 03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives On completion of the course the student will be able to
CO-1	Learn Syntax and Semantics and create Functions in Python;
CO-2	Handle Strings and Files in Python;
CO-3	Understand Lists, Dictionaries and Regular expressions in Python;
CO-4	Implement Object Oriented Programming concepts in Python;
CO-5	Build Web Services and introduction to Network and Database Programming in Python.

Mapping of CLOs with PSOs &CDLs			
CLOs No.	**Course Learning Outcomes(CLOs)** **On completion of the course the student will learn to**	**PSOs Addressed**	**CLDs**
CLO-1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions;	**PSO-1 & PSO-2**	**Understand Analyse**
CLO-2	Demonstrate proficiency in handling Strings and File Systems;	**PSO-3**	**Analyse Evaluate**
CLO-3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions;	**PSO-1 & PSO-2**	**Analyse Apply Evaluate**
CLO-4	Interpret the concepts of Object-Oriented Programming as used in Python;	**PSO-6**	**Evaluate**
CLO-5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.	**PSO-5**	**Analyse**

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION** Why should you learn to write programs, Variables, expressions and statements, Conditional execution, Functions *Key words-understanding the basics of python programming with tokens*	12Hrs
2.0	**FUNCTIONS** Iteration, Strings, Files Lists, Dictionaries, Tuples, Regular Expressions *Key words-understanding and implementing functions*	12Hrs
3.0	**CLASSESAND OBJECTS** Classes and objects, Classes and functions, Classes and methods	12Hrs

		Key words-understanding and implementing objective oriented concepts	
4.0	**NETWORK AND WEB SERVICES** Networked programs, Using Web Services, Using databases and SQL *Key words-understanding networking and DBMS concepts*		**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Introduction to Computer Science Using Python	Charles Dierbach,	1ST	-
2	Programming Python	Mark Lutz	4TH	2011
3	Core Python Applications Programming	Wesley J Chun	3RD	2015
4	Data Structures and Algorithms in Python	Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich	1ST	2016
5	Python Programming using problem solving approach	ReemaThareja	1ST	2017

Course Title	MOBILE COMPUTING							
Course Type	Soft Core- Theory		Total Hours	48	Hours/Week	04	Credits	04
Course Code	C0320	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
CO-1	To learn the basic concepts, aware of the GSM, SMS, GPRS Architecture.
CO-2	To have an exposure about wireless protocols -WLN, Bluetooth, WAP, ZigBee issues
CO-3	To Know the Network, Transport Functionalities of Mobile communication
CO-4	To understand the concepts of Adhoc and wireless sensor networks.
CO-5	To impart knowledge about Mobile Application Development

Mapping of CLOs with PSOs &CDLs

Course Learning Outcomes(CLOs): The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there maybe 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Gain the knowledge about various types of Wireless Data Networks and Wireless Voice Networks.	**PSO – 2**	**Understand**
CLO-2`	Understand the architectures, the challenges and the Solutions of Wireless Communication those are in use	**PSO – 4**	**Understand**
CLO-3	Realize the role of Wireless Protocols in shaping the future Internet	**PSO – 3**	**Analyze**
CLO-4	Know about different types of Wireless Communication Networks and their functionalities	**PSO - 6**	**Evaluate**

Units	Course Content/ Syllabus	Duration
1.0	**WIRELESS COMMUNICATION FUNDAMENTALS, ARCHITECTURE:** Introduction, frequencies spectrum, multiplexing, spread spectrum, GSM v/s CDMA, 2G mobile wireless services, comparison of 2G and 3G, GSM architecture, entities, call routing, PLMN, address and identifiers network aspects *Keywords:*	**06Hrs**
1.2	Mobility Management, frequency allocation, authentication and security, SMS architecture, value added service through SMS, GPRS-GPRS and packet data network, architecture network operations, data service-application *Keywords:*	**06Hrs**
2.0	**MOBILE WIRELESS SHORT RANGE NETWORKS:** Introduction, equipment-WLAN, topologies-WLAN, WLAN MAC-security of WLAN,	**04hrs**

	technologies-IEEE 802.11 architecture, power management-standards, WAP architecture, WAP 2.0, Bluetooth enabled devices network, Layers in Bluetooth Protocol, security in Bluetooth, IrDA, ZigBee *Keywords:*	
2.1	Mobile IP network layer, transport layer , IP and mobile IP network layer, packet delivery and handover management, location management, registration, tunnelling and encapsulation *Keywords:*	**04Hrs**
2.2	Route Optimization, dynamic host configuration protocol, VoIP, IPsec, mobile transport layer, conventional TCP/IP transport layer protocol, indirect, snooping, mobile TCP *Keywords:*	**04Hrs**
3.0	**MOBILE AD-HOC & SENSOR NETWORKS:** Introduction to Mobile Ad hoc Network, MANET, routing and routing algorithm, security, wireless sensor networks, distributed network and characteristics, communication coverage sensing coverage, applications, localization, routing, function computation- scheduling *Keywords:*	**12Hrs**
4.0	**MOBILE APPLICATION DEVELOPM:** Mobile applications development, application development overflow, techniques for composing, applications, understanding the android software stack, android application architecture, developing for android , the android application life cycle *Keywords:*	**06Hrs**
4.1	The Activity Life Cycle, creating your first android activity, creating applications and activities, creating user , intents, broadcast receivers, adapters, data storage, retrieval, and sharing, geo services, creating mobile applications like game, clock, calendar, convertor, phone book, text editor *Keywords:*	**06Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Mobile Computing	Asoke K Talukder Hasan Ahmed, Roopa R Yavagal	-	2010
2	Mobile Computing	Raj Kamal	2nd	2012
3	Wireless Networking Complete reference	Pei Zheng, Larry L. Peterson, Bruce S. Davie, Adrian Farrell	-	2009
4	Wireless Communications & Networking	Vijay K Garg	-	2010
5	Mobile Communications	JochenSchillar	2nd	-

SECOND YEAR - SEMESTER – III

Course Title		CLOUD COMPUTING						
Course Type	Soft Core- Theory	Total Hours	64	Hours/Week	04	Credits	04	
Course Code	C0330	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To understand the concept of Virtualization and design of cloud Services
CO-2	To be familiar with the lead players in cloud.
CO-3	To apply different cloud programming model as per need
CO-4	To learn to design the trusted cloud Computing system

Mapping of CLOs with PSOs
&CDLs

Course Learning Outcomes (CLOs): The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there may be 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Compare the strengths and limitations of cloud Computing	PSO – 1,2	Evaluate
CLO-2	Identify the architecture, infrastructure and delivery models of cloud computing	PSO – 4	Analyze
CLO-3	Apply suitable virtualization concept.	PSO – 3,5	Apply
CLO-4	Choose the appropriate cloud player Programming Models and approach	PSO – 6	Analyze
CLO-5	Address the core issues of cloud computing such as security, privacy and interoperability	PSO - 8	Analyze

Units	Course Content/ Syllabus	Duration
1.0	**CLOUD COMPUTING:** Cloud architecture and model, cloud computing basics, applications, cloud models, cloud service models, service management, computing on demand software architecture issues, cloud benefits and limitations *Key words- Analysis of cloud architecture and models*	**12Hrs**
2.0	**CLOUD HARDWARE AND INFRASTRUCTURE:** Introduction to cloud hardware, clients, security, network, services, platforms, cloud storage, operating system for the cloud, application patterns and architecture. *Key words- Analyzing cloud infrastructure*	**12Hrs**

3.0	**VIRTUALIZATION:**Basics of Virtualization, types of virtualization, implementation levels, virtualization structures, virtualization of CPU, memory, I/O devices, virtual clusters and resource management, virtualization for data-centre automation *Key words- Analyzing the concept of virtualization in cloud computing*	**06Hrs**
3.1	**SECURITY:** Security overview, cloud security challenges and risk, risk management, security monitoring. *Key words- Analyzing and evaluating security management in clouds.*	**06Hrs**
4.0	**PROGRAMMING MODEL:** Introduction to Parallel and distributed programming paradigms, Introduction to map-reduce, twister and iterative map-reduce, hadoop library from apache. *Key words- Analysis of the mapping technique in cloud.*	**06Hrs**
4.1	Mapping applications, Google app engine, amazon AWS, cloud software environments, eucalyptus, openstack, aneka, cloudsim, open nebula *Key words- Evaluating different cloud providing platforms*	**06Hrs**

REFERENCES

SL no	Title of the book	Authors	Edition	Year of Publication
1	Cloud Computing –A Practical Approach	Anthony T.Velte, Toby J.Velte, Robert Elsenpeter	-	2009
2	Cloud Computing: Web based Applications that change the way you work and Collaborate online	Michael Miller	-	2008
3	Cloud Computing Best Practices for Managing and Measuring Processes for on demand computing, Applications and Data Centers in the Cloud with SLAs	Haley Beard	-	2008
4	A Comparative Analysis of Cloud Computing Environments	Prof (Dr.) Andreas Polze	4th	2003
5	Cloud Computing: Implementation, Management, and Security	John W.Rittinghouse and James F.Ransome	-	2010
6	Cloud Security – A comprehensive Guide to Secure Cloud Computing	Ronald L. Krutz, Russell Dean Vines	-	2010

Course Title	MATHEMATICAL COMPUTATION							
Course Type	Soft Core- Theory(ID)		Total Hours	48	Hours/Week	04	Credits	04
Course Code	C0530	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (Cos)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To understand fundamental concepts in graph theory, lattices, matrices and Boolean algebra; .
CO-2	To introduce MATLAB programming with few examples.

Mapping of CLOs with PSOs &CDLs

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Solve problems using algebraic properties;	**PSO-1 & PSO-2**	**Understand Analyse**
CLO-2	Identify bounded and complete lattice;	**PSO-6 & PSO-7**	**Analyse Evaluate**
CLO-3	Use MATLAB for solving problems on vectors, matrices, plotting data etc.	**PSO-4 & PSO-5**	**Analyse Apply Evaluate**

Units	Course Content/ Syllabus	Duration
1.0	**GRAPH THEORY AND LATTICES:** Partially ordered sets, lattices, complete lattices, distributed lattices, complements, Boolean algebra, Boolean expressions, application to switching circuits, graphs, vertices of graphs, walks and connectedness, degrees, operations on graphs, trees: elementary properties of trees *Keywords: Analysis of graph theory*	**18Hrs**
2.0	**MATRIX ALGEBRA:** Matrix definition, types of matrix, transpose of matrix, determinants, properties of determinants, co factors matrix, Cramer's rule, adjoin matrix, inverse of a matrix, problems on singular and non-singular matrix *Keywords: Analysis of matrix algebra*	**10Hrs**
1.0	**INTRODUCTION TO MATLAB:**MATLAB Basics, Programming Environment: MATLAB Windows, A First Program, Expressions, Constants, Variables and assignment statement. Array operations: performing calculations with vectors, creating multiple plots; working with matrix. *Key words- understanding the fundamentals of MATLAB*	**12Hrs**

2.0	**Loops and execution control :** programming constructs, user interaction, flow control, loops, functions: creating functions, calling functions, setting the MATLAB path, debugging *Key words-Working with different decision making and looping statement in MATLAB*	**5Hrs**

REFERENCE

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Basics of mathematics,	Kate S.K Bhapkar H.R:	-	-
2	S.Lipschutz and M.Lipson: Theory and problems of discrete mathematics –	AtulKahate, Tata McGraw Hill	2nd	-
3	Basic graph theory,	K.R.Parthasarathy	-	1994.
4	Elements of discrete mathematics	L.Liu	-	1986.
5	The theory of matrices with applications , Academic press	Lancaster and Tismenetsky	2nd	1984.
6	Programming in MATLAB, Cengage learning,	Marc E Herniter	-	2000.
7	Getting started with Matlab, oxford university press,.	RudraPatap:	-	2010

SECOND YEAR - SEMESTER – IV

Course Title	**INTERNET OF THINGS**							
Course Type	Soft Core- Theory		Total Hours	64	Hours/Week	04	Credits	04
Course Code	D0220	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
CO-1	The main objective of this module is to introduce to the students the concepts of internet of things
CO-2	It starts with an overview of interactive internet of things, and concepts of cloud and web and demonstrates few application of IOT and explains logic in business modeling

Mapping of CLOs with PSOs &CDLs

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn	PSOs Addressed	CLDs
CLO-1	To list the concepts of IOT	**PSO-1 & PSO-2**	**Understand Analyze**
CLO-2	To implement various middleware's of the sensors	**PSO-6 & PSO-7**	**Analyze Evaluate**
CLO-3	To describe the importance of cloud and web in IOT	**PSO-4 & PSO-5**	**Analyze Apply Evaluate**
CLO-4	To understand a the applications of IOT	**PSO-1**	**Understand**

Units	Course Content/ Syllabus	Duration
1.1	**INTRODUCTION TO IOT** **What isIoT**, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, The Core IoT Functional Stack, IoT Data Management and Compute Stack. *Keyword: design and structures of iot*	**6Hrs**
1.2	**IoT** middleware, four pillars:RFID,SCADA,WSN,M2M of IoT *Keyword: the middleware and pillars*	**6Hrs**

2.1	**SMART OBJECTS** The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects, Communications Criteria, IoT Access Technologies. *Keyword: introducing the smart objects and technologies*	**6Hrs**
2.2	**IOT protocols**: network protocols, data protocols and iot standardization with security issues *Keyword: protocol and iot standardization*	**6Hrs**
3.1	**DATA AND ANALYTICS FOR IOT** An Introduction to Data Analytics for IoT, Machine Learning, Big Data Analytics Tools and Technology, Edge Streaming Analytics, Network Analytics, Securing IoT, A Brief History of OT Security, Common Challenges in OT Security, How IT and OT Security Practices and Systems Vary, Formal Risk Analysis Structures: OCTAVE and FAIR, The Phased Application of Security in an Operational Environment *Keyword: data analytics and machine learning concepts*	**12Hrs**
4.1	**IOT PHYSCIAL DEVICES AND ENDPOINTS** Arduino UNO: Introduction to Arduino, Arduino UNO, Installing the Software, Fundamentals of Arduino Programming. IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, About the RaspberryPi Board: Hardware Layout, Operating Systems on RaspberryPi, Configuring RaspberryPi, Programming RaspberryPi with Python, Wireless Temperature Monitoring System Using Pi, DS18B20 Temperature Sensor, Connecting Raspberry Pi via SSH, Accessing Temperature from DS18B20 sensors, Remote access to RaspberryPi, Smart and Connected Cities, An IoT Strategy for Smarter Cities, Smart City IoT Architecture *Keywords: application of iot and sensors*	**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	The Internet of Things in the Cloud: A Middleware Perspective	Honbo Zhou	-	2012
2	Architecting the Internet of Things	Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds)	1st	2011
3	Networks, Crowds, and Markets	David Easley and Jon Kleinberg	2nd	2010
4	The Internet of Things: Applications to the Smart Grid and Building	Olivier Hersent, Omar Elloumi and David Boswarthick	-	-

SECOND YEAR - SEMESTER – IV

Course Title	PHP PROGRAMMING							
Course Type	Soft Core- Theory		Total Hours	64	Hours/Week	04	Credits	04
Course Code	D0310	Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives On completion of the course the student will be able to
CO-1	Understand how server-side programming works on the web.
CO-2	Giving all students exposure to basic of PHP
CO-3	To provide the necessary knowledge to design and develop dynamic, database driven applications using PHP.
CO-4	Understand secure submission.

Mapping of CLOs with PSOs &CDLs

Course Learning Outcomes(CLOs): The CLOs indicate whatastudent has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course. For every course there maybe 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Write PHP code to produce outcomes and solve problems	**PSO-1,PSO-2**	**Create**
CLO-2	Display and insert data using PHP and MySQL	**PSO-3,PSO-5**	**Evaluate Create**
CLO-3	Analyze and solve various database tasks using the PHP language	**PSO-7,PSO-9**	**Analyze**
CLO-4	Build dynamic website using server side PHP Programming and Database connectivity	**PSO-10**	**Create**

Units	Course Content/ Syllabus	Duration
1.0	**INTRODUCTION:** Introduction, Introduction to Server Side Programming, Introduction to PHP, PHP and HTML, Essentials of PHP, Why Use PHP, Installation of Web Server, WAMP Configurations *Key words- understanding server side programming*	**04Hrs**
1.1	**PHP BASIC:** Writing simple PHP program, Embedding with HTML, Comments in PHP, Variables, naming conventions, Data types, Operators *Key words- Understanding various components of PHP*	**04Hrs**
1.2	**STRINGS:** String concatenation, string functions, float functions *Key words- Analyzing different String functions*	**04Hrs**

2.0	**ARRAYS:** Introduction, array–key pair, array functions, value, isset(), unset(), gettype(), settype(), control statements(if,switch) loops *Key words- Understanding arrays in PHP and analyzing different operation on arrays*	**04Hrs**
2.1	**Functions:** Built-in functions, user defined functions(with argument and return values), Globalvariable, default value *Key words- understanding and analyzing Functions in PHP*	**04Hrs**
2.2	Get & Post method, url encoding, html encoding, cookies, sessions *Key words- Analyzing and evaluating concepts of data transaction*	**04Hrs**
3.0	**FILES:** Basic, Creating, Reading from file and writing into file. Different file operation methods. *Key words- Applying different file operations*	**03Hrs**
3.1	**MySQL:** Introduction to MySQL, CRUD - select statements, creating database/tables, inserting values, updating and deleting *Key words- Creating data base using MySQL queries*	**04Hrs**
3.2	**PHP WITH MYSQL:** Creating connection selecting database, perform database (query), use returned data, close connections, file handling in PHP, using MySQL from PHP. *Key words- Creating data base using PHP script*	**06Hrs**
4.0	**OOPs:** Introduction to OOPS, creating classes, creating objects, setting access to properties and methods, constructors, destructors. *Key words- Analyzing OOPs concept and creating class and objects*	**04Hrs**
4.1	**INHERITANCE and POLYMORPHISM:** Access specifiers**,** Types of Inheritance, Abstract class, Interface, Method Overloading *Key words- Evaluating different inheritance methods and polymorphism*	**04Hrs**
4.2	**FORM VALIDATION:** Forms, Building a form, Validating a form. *Key words- Creating forms and validating it.*	**04Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	PHP: The Complete Reference	Steven Holzner	-	2008
2	PHP: A Beginner's Guide	VikramVaswani	1st	2008
3	Beginning PHP 5.3	Willey Publishing	2nd	2010
4	PHP and MySQL Web Development	Luke Welling Laura Thomson	4th	2003

Course Title	**NETWORK SECURITY**						
Course Type	Soft Core- Theory	Total Hours	64	Hours/Week	04	Credits	04
Course Code	D0320	Evaluation	Internal	C1+C2 = 15+15		30 Marks	100
			External	Duration	C3	03Hrs	70 Marks

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To understand best security practices and how to take advantage of the networking gear that is already available;
CO-2	To learn design considerations for device hardening, Layer 2 and Layer 3 security issues denial of service, IPSec VPNs, and network identity.

Mapping of CLOs with PSOs &CDLs

CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Identify some of the factors driving the need for network security	PSO-2	Analyse
CLO-2	Define the terms vulnerability, threat and attack;	PSO-1	Understand
CLO-3	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems.	PSO-3	Evaluate

Units	Course Content/ Syllabus	Duration
1.1	**INTRODUCTION** Basic concepts, Confidentiality, integrity, availability, security policies, Security mechanisms, assurance *Key words-understanding basics of network security*	**6Hrs**
1.2	Security, Attacks, Services, Mechanisms, Security Attacks, Security Services, Model for Network Security, Conventional Encryption and Message Confidentiality *Key words-understanding different types of services*	**6Hrs**
2.1	**ENCRYPTION TECHNIQUES** Principles and techniques, conventional encryption principles, conventional encryption algorithms, location of encryption devices, key distribution, public key *Key words –understanding fundamentals of encryption techniques*	**6Hrs**
2.2	Cryptography and message authentication, approaches to message authentication, SHA-1, MD5, public-key *Key words-understanding different encryption algorithms*	**6Hrs**

3.1	**KERBEROS AND IP SECURITY** Kerberos, motivation, Kerberos version 4, PGP Notation, PGP operational description IP security *Key words-understanding ip security concepts*	**6Hrs**
3.2	IP Security, overview, IP security architecture, authentication header web security *Key words- understanding the variances of IP*	**6Hrs**
4.1	**WEB SECURITY, INTRUDERS AND FIREWALL** Web Security, web security threats, web traffic security approaches, overview of secure socket layer and transport layer security, overview of secure electronic transaction, intruders and viruses *Key words-understanding network security*	**4Hrs**
4.2	Intruders, Introduction, intrusion techniques, password protection, password selection strategies, intrusion detection, malicious programs, nature of viruses, types of viruses, macro viruses, antivirus approaches firewalls *Key words-understanding the concepts of malicious software*	**4Hrs**
4.3	Firewall, characteristics, types of firewalls, firewall configuration *Key words-learning firewall and its configuration*	**4Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	"Network Security Essentials: Applications and Standards"	William Stallings	5th	2013
2	"Network Security private communication in a public world"	C. Kaufman, R. Perlman and M. Speciner	2nd	2017
3	Cryptography and Network Security"	William Stallings	6th	2014
4	"Designing Network Security"	MerikeKaeo	2nd	2013
5	"Building Internet Firewalls"	Elizabeth D. Zwicky, Simon Cooper, D. Brent Chapman	2nd	2000
6	"Practical Unix & Internet Security"	SimsonGarfinkel, Gene Spafford, Alan Schwartz	3rd	2003

Course Title	BIG DATA ANALYTICS						
Course Type	soft Core-Theory	Total Hours	64	Hours/Week	04	Credits	04
Course Code	D0330	Internal	C1+C2 = 15+15			30 Marks	100
		External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able to
CO-1	Demonstrate knowledge of big data analytics; and learn to analyse the concepts of big data
CO-2	Demonstrate the ability to use technical skills in predicative and prescriptive modelling to support business decision-making
CO-3	Demonstrate the ability to think critically in making decision based on data and deep analytics

Mapping of CLOs with PSOs &CDLs

Course Learning Outcomes (CLOs): The CLOs indicate what a student has learnt after the successful completion of a course. The CLO statements are prepared by considering the course content covered in each unit of a course.For every course there may be 5 or more CLOs. **The keywords are used at the end of each unit to define CLOs.**

CLOs No.	Course Learning Outcomes (CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Understand the big data concepts and tools	PSO-1	Understand
CLO-2	learn to analyze the big data using intelligent techniques	PSO-1 PSO-3	Apply Create Evaluate
CLO-3	understand the various search methods and visualization techniques	PSO-1 PSO-4 PSO-5 PSO-11	Apply Create

Units	Course Content/ Syllabus	Duration
1.1	Introduction to big data platform, challenges of conventional systems, intelligent data nature of data, Analytical process and tools, analysis v/s reporting modern data analytic tools *Keyword: Understanding the concept of bigdata*	**5Hrs**
1.2	Statistical concepts, sampling distributions, re-sampling, statistical inference, prediction error, mining data streams, introduction to streams concepts, stream data model and architecture, stream computing sampling data in a stream, filtering streams *Keywords: Understanding different types of distribution and techniques*	**5Hrs**
1.3	Counting distinct elements in a stream, decaying window, real time analytics platform(RTAP)applications, estimating moments, counting oneness in a window Case Studies, real time sentiment analysis, stock market predictions	**6Hrs**

	Keywords: understand concepts of real time case studies	
2.1	Introduction, history of hadoop, the hadoop distributed file system, components of hadoop, analyzing the data with hadoop, scaling out, hadoop streaming, design of HDFS, java interfaces to HDFS basics *Keywords: basic techniques of bigdata*	**8Hrs**
2.2	Developing a map reduce application, how map reduce works, anatomy of a map reduce job run, failures, job scheduling, shuffle and sort – task execution, map reduce types and formats- map reduce features *Keywords: Understanding the concept of map and hadoop*	**8Hrs**
3.1	Hadoop cluster, setting up a hadoop cluster, cluster specification, cluster setup and installation *Keywords: Understanding clusters and applications*	**8Hrs**
3.2	Configuration, security in hadoop, administering hadoop, HDFS, monitoring and maintenance, hadoop benchmarks,hadoop in the cloud *Keywords: understanding monitoring and benchmarks*	**8Hrs**
4.1	Applications on Big Data Using Pig and Hive, Data processing operators in Pig, Hive services, HiveQL, Querying Data in Hive, Fundamentals of HBase and ZooKeeper, IBM.InfoSphereBigInsights and Streams, Visualizations, Visual data analysis techniques, Interaction techniques, Systems andapplications *Keywords: understanding the concept of hive and fundamentals of its operations*	**16Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Publisher	Edition	Year of publication
1	Intelligent Data Analysis	Michael Berthold, David J. Hand,	springer		2007
2	Hadoop: The Definitive Guide	Tom White	O'reilly Media	3rd	2012
3	Understanding Big Data: Analytics for Enterprise Class Hadoop and Streaming Data	Chris Eaton, Dirk DeRoos, Tom Deutsch, George Lapis, Paul Zikopoulos	McGrawHill		2012

GENERIC ELECTIVE COURSES FOR OTHER DEPARTMENTS

FIRST YEAR - SEMESTER – I

Course Title	**INTERNET FUNDAMENTALS**							
Course Type	Open Elective- Theory		Total Hours	64	Hours/Week	04	Credits	04
Course Code		Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)	
CO No.	**Course Objectives** On completion of the course the student will be able
CO-1	To learn basic principles of using windows operation
CO-2	To access internet, World Wide Web, internet directories and search engines;
CO-3	To learn basic networking skills
CO-4	To learn web languages

Mapping of CLOs with PSOs &CDLs			
CLOs No.	**Course Learning Outcomes(CLOs)** **On completion of the course the student will learn to**	**PSOs Addressed**	**CLDs**
CLO- 1	Create web pages	**PSO-2**	**Create**
CLO-2	Describe and explain the fundamental components of Internet	**PSO-5**	**Understand**

Units	Course Content/ Syllabus	Duration
1.0	**ELECTRONIC MAIL:** Introduction, advantages and disadvantages, User IDs, Passwords, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Mime types, Newsgroups, mailing lists, chat rooms *Keywords: Understanding E-mails*	**06Hrs**
1.1	**INTERNET**: Introduction to networks and internet, history, Working of Internet, Internet Congestion, internet culture, business culture on internet. Collaborative computing & the internet. Modes of Connecting to Internet, Internet Service Providers(ISPs), Internet address, standard address, domain name, DNS *Keywords: Understanding the concept of internet*	**06Hrs**
2.0	**WORLD WIDE WEB:** Introduction, Miscellaneous Web Browser details, searching the www: Directories search engines and meta search engines, search fundamentals, search strategies, working of the search engines, Telnet and FTP *Keywords: Understanding the concept of surfing*	**06Hrs**

2.1	**Introduction to Browser:** Coast-to-coast surfing, hypertext markup language, Web page installation, Web page setup, Basics of HTML& formatting and hyperlink creation. Using FrontPage Express, Plug-ins *Keywords: Understanding browsers*	**06Hrs**
3.0	**LANGUAGES:** Basic and advanced HTML, java script language, Client and Server Side Programming in java script. Forms and data in java script *Keywords: Learning basics of markup languages*	**06Hrs**
3.1	**Introduction to Web Servers:** PWS, IIS, Apache; Microsoft Personal Web Server. Accessing & using these servers *Keywords: Understanding different servers*	**06Hrs**
4.0	**PRIVACY AND SECURITY TOPICS:** Introduction, Software Complexity, Encryption schemes, Secure Web document, Digital Signatures, Firewalls *Keywords: Analysis of the security methods in internet*	**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	Computers Today The Internet: The Basics	Jason Whittaker	1st	2002
2	The internet Fundamentals	HosseinBidgoli	1st	2011

FIRST YEAR – SEMESTER - II

Course Title	MULTIMEDIA TECHNOLOGY							
Course Type	Open Elective- Theory		Total Hours	48	Hours/Week	04	Credits	04
Course Code		Evaluation	Internal	C1+C2 = 15+15			30 Marks	100
			External	Duration	C3	03Hrs	70 Marks	

COURSE OBJECTIVES (COs)	
CO No.	Course Objectives
	On completion of the course the student will be able to
CO-1	The objective of this course is to expose the students to the implementation techniques of database system
CO-2	This course explains techniques for query processing and optimization with transaction and concurrency control techniques.

Mapping of CLOs with PSOs &CDLs			
CLOs No.	Course Learning Outcomes (CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO-1	Students will be aware of the rapid rate of change of technology and methodology in multimedia environment	PSO-1	Understand
CLO-2	Students will be familiar with techniques and resources in order to obtain knowledge and understanding of new developments in multimedia technology	PSO-1 PSO-6	Understand Evaluate
CLO-3	Demonstrate knowledge of the legalities involved in multimedia creation and distribution.	PSO-2 PSO-6	Create Evaluate

Units	Course Content/ Syllabus	Duration
1.1	Introduction to multimedia, what is multimedia?, defining the scope of multimedia, applications of multimedia, hardware and software requirements, analog representation, digital representation, need for digital representation *Keywords: Understanding multimedia and its requirements*	**6Hrs**
1.2	Waves, A to D conversion, D to A conversion, relation between sampling rate and bit depth, quantization error, Fourier representation, pulse modulation, importance and drawback of digital representation *Keywords: Learning A to D and D to A conversion*	**6Hrs**
2.1	**TEXT AND IMAGE:** Types of images, color models, basic steps for image processing, principle and working of scanner and digital camera, gamma and gamma correction *Keywords: Understanding the concept of image processing*	**12Hrs**
3.1	**AUDIO AND VIDEO TECHNOLOGY:** Fundamental characteristics of sound, psychoacoustics, raster scanning principles, sensors for TV cameras, color fundamentals, additive and subtractive color mixing, liquid crystal display (LCD), plasma display panel (PDP), file formats	**12Hrs**

	Keywords: Understanding audio and video technology	
4.1	**COMPRESSION AND CODING:** Introduction to compression, What is compression? need for compression, types of compression- basic compression techniques-run length, Huffman's coding, JPEG, zip coding, overview of image and video compression techniques *Keywords: Understanding the concept of compression and coding*	**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Publisher	Edition	Year of publication
1	Multimedia Systems Design	Prabhat K. Andleigh and KiranThakrar	PHI publication	1st	1994
2	Multimedia systems	John F. Koegal Buford-	Pearson Education,	1st	2002
3	Fundamentals of multimedia	Ze-Nian Li and MS Drew.	PHI EEE edition,	1st	2003

RECOMMENDED BOOKS					
1	Principles of multimedia	Ranjan Parekh.	Tata McGraw-Hill.	-	-

FIRST YEAR – SEMESTER - III

Course Title	WEB DESIGNING								
Course Type	Open Elective- Theory		Total Hours	48	Hours/Week	04	Credits		04
Course Code		Evaluation	Internal	C1+C2 = 15+15			30 Marks		100
			External	Duration	C3	03Hrs	70 Marks		

COURSE OBJECTIVES (COs)

CO No.	Course Objectives
	On completion of the course the student will be able
CO-1	To have knowledge and skills to build creative, interactive and well-designed websites.
CO-2	To attempt to balance technical skills with artistic skills to create web pages that are conceptually interesting, easily navigable, visually pleasing and functioning.

Mapping of CLOs with PSOs &CDLs			
CLOs No.	Course Learning Outcomes(CLOs) On completion of the course the student will learn to	PSOs Addressed	CLDs
CLO- 1	Employ fundamental computer theory to basic programming techniques	**PSO-1**	**Understand**
CLO-2	Create and manipulate web media objects	**PSO-3**	**Create**
CLO-3	Select and apply markup languages	**PSO-6**	**Evaluate**
CLO-1	Use fundamental skills to maintain web server services	**PSO-2**	**Create**

Units	Course Content/ Syllabus	Duration
1.0	**HTML**: HTML fundamental tags: HTML document structure, Using paragraph tags, Aligning paragraphs, block-level and inline tags, Controlling line breaks and spaces, Formatting text with phrase element tags, Formatting text with font markup elements *Keywords:* Understanding different concepts in HTML	**12Hrs**
2.0	**FUNCTIONS:** Adding document structure with headings, Formatting quotations and quote marks, Preserving pre-formatted text, Selecting a typeface, Selecting a type size, using ordered and n-ordered lists, Using inline images, Flowing text around an image, Breaking lines around an image *Keywords:* Working with different functions available in HTML	**12Hrs**
3.0	**WORKING WITH HYPERLINKS:** Using relative URLs, Specifying a base URL , Linking within a page using	**12Hrs**

		fragments, Creating image links, table tags, Formatting tables with CSS, Aligning images with tables, frame tags, Hiding frame borders .inserting Graphics, Image Mapping *Keywords:* Understanding and working with URLs, CSS.	
4.0	**CSS**: Cascading Style Sheets (CSS) – types of Cascading Style Sheets. Use of different CSS in web page creation *Keywords:* Understanding the use of different types of CSS.	**12Hrs**

REFERENCES

Sl. No	Title of the book	Authors	Edition	Year of publication
1	HTML programmers reference	Thomas a Powell / Dan Whitworth	2nd	2001
2	HTML & JAVA script programming concepts	Shane turner e / Karl Barksdale	1st	1999
3	HTML Introduction to web page design & Development	David mercer	-	2001
4	HTML & XML an Introduction	NIIT	-	2003
5	HTML & JavaScript for Visual Learners	Chris Charuhas	-	2008
6	Magic with HTML, DHTML & JavaScript	Dr.Ravinder Singh AmitGupta	1st	2009
7	HTML, XHTML, CSS and XML by Example A Practical Guide	TeodoruGugoiu	-	2007
8	Internet and its Applications with HTML & VB-Script	Prof. ShashiBanzal	1st	2009

ST.PHILOMENA'S COLLEGE (AUTONOMOUS), MYSURU
QUESTION PAPER BLUEPRINT

MSc C3 COMPONENT   TOTAL MARKS:70

Section A	
1. Answer any five of the following	**2×5=10**
a)	
b)	
c)	
d)	
e)	
f)	
g)	
Section B	
Answer ONE FULL question from each section	**15×4=60**
Module 1	
2.	(15m)
a)	
b)	
c)	
OR	
3.	(15m)
a)	
b)	
c)	
Module 2	
4.	(15m)
a)	
b)	
c)	
OR	
5.	(15m)
a)	
b)	
c)	
Module 3	
6.	(15m)
a)	
b)	
c)	
OR	
7.	(15m)
a)	

b)	
c)	
Module 4	
8.	(15m)
a)	
b)	
c)	
OR	
9.	(15m)
a)	
b)	
c)	

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