Shree H. V. P. Mandal's

Degree College of Physical Education, Amravati.

(Multi-faculty Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY (SCIENCE GROUP)



CURRICULUM SCHEME AND SYLLABUS OF

FIRST YEAR MASTER OF SCIENCE (COMPUTER SCIENCE) (Choice Based Credit System) Program Code: MSC2017

Introduced from the Session 2017-2018

Master of Science in Computer Science (M. Sc. Computer Science)

Programme Outcomes (PO): The following Programme Outcomes are attained after completion of this programme:

- PO 1. Students become successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms.
- PO 2. Able to contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise.
- PO 3. Capable to achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, design and implementation skills.
- PO 4. Successfully pursue lifelong learning to fulfill their goals.

Programme Specific Outcomes (PSO): M.Sc. (Comp. Sci.) has been designed to prepare graduates for attaining the following Programme Specific Outcomes:

- PSO 1. Able to select modern computing tools and techniques and use them with dexterity.
- PSO 2. Able to identify, analyze, formulate and develop computer based solutions to meet desired needs within realistic constraints such as safety, security and applicability.
- PSO 3. Able to devise and conduct experiments, interpret data and provide well informed conclusions.
- PSO 4. Identify research and development areas in multiple disciplines.

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SPECIAL NOTE FOR THE STUDENTS

1) This is notified for general information and guidance of all concerned for admission and examination to Master of Science in Computer Science.

2) All the students desirous to take examinations for which this prospectus has been prescribed should if found necessary for any other information regarding examinations etc. refer the examination rules of this autonomous college.

Pattern of Question Papers for Semester/Final Examinations of **MSc Programme in Choice Based Credit System**

For Theory Examination

- 1. Under the CBCS curriculum, the semester/final theory examination shall be conducted for each course (Subject) as per the schedule declared by the Examination Section.
- 2. The question paper shall be of maximum 70 marks, containing ten questions, two questions on each unit and students are required to attempt any one of two.
- 3. No objective type multiple choices question allowed.
- 4. Every question will be of fourteen marks and may contain sub questions. Distribution of marks shall be given on the right of each question.
- 5. The questions' numbering will be as follows: Q. 1: or Q. 2:, Q. 3: or Q. 4:, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q.10
- 6. The question shall be target to evaluate knowledge, skill, thinking ability and application. Weightage shall be given in decreasing order of Knowledge, thinking ability, application and skill.

For Practical Examination

- 1. Question paper for practical examination will be of 20 Marks, two questions of ten marks each.
- 2. Question number one shall contain six problems/programs/experiments and student attempt any two out of these questions.
- 3. Question number two contain two sub questions (a) and (b) each of five mark.
- 4. Question number 2(a) contain five MCQ. Question number 2(b) contain one logical question/problem to test students' ability of solving problems (Setter may ask to solve real life problems based on case study)

Examination Leading to the Degree of Master of Science (Computer Science) (Bi-annual Pattern) (Two Year Course)

Whereas, it is expedient to prepare a new rule for Examination leading to the Degree of Master of Science (Computer Science) (Bi-annual) (Two Year Course) under CBCS for the purposes hereinafter appearing in the Academic Board and Board of Management.

- 1. This Rule may be called "Examination Leading to the Degree of Master of Science (Computer Science) (Bi-Annual Pattern) (Two Year Course) CBCS.
- 2. This rule shall come into force w.e.f. the Session 2017-18 for the Degree of Master of Science (Computer Science) (Bi-Annual Pattern) (Two Year Course) under CBCS.
- 3. Subject to their compliance with the provisions rules in force from time to time. The following person shall be eligible for admission to M.Sc. first year (Computer Science).
 - a) A person who has passed the degree of Bachelor of Science of any statutory University with Computer Science / Computer Application as one of the subjects.

OR

b) A Person who has passed B.A. / B.Sc. with Mathematics plus post Graduate Diploma in Computer Science of S.G.B. Amravati University.

OR

- c) A person who has passed a Degree of bachelor of Computer Science.
- A person who has passed M.Sc. First Year Computer Science of this Autonomous college or any other affiliated colleges of S.G.B.AmravatiUniversity shall be eligible for admission to M.Sc.Second Year (Computer Science).
- 5. The Degree of Master of Science (Computer Science) shall be awarded to an examinee who, in accordance with the provisions of this rule qualifies for the degree.
- 6. Duration of the Programme shall be two academic Years. The First Year M.Sc. (Computer Science) divided into two semesterscalled as Semester I, Semester II. The Second Year M.Sc. (Computer Science) also divided into two semesterscalled as Semester III and Semester IV. The College shall hold Examination in Winter and in Summer every year for both the even and odd semester.
- 7. The regular Examination of Semester–I and Semester- III shall be conducted in winter & the regular Examination of Semester- II and Semester- IV shall be conducted in summer every year.Supplementary Examination for Semester– I and Semester- III shall be held in summer and the supplementary examination for Semester–II and Semester-IV shall be held in held in winter every year.
- 8. For purpose of instructions and Examinations the students shall study sequentially.
- 9. The period of academic session / term shall be such as may be notified by this

AutonomousCollege.

- 10. The Examinations as given in Para 7 above shall be held at such dates as may be notified by this autonomous college.
- 11. Subjects to his/her compliance with the provision of this rule and of other rules pertaining to examinations in force from time to time the applicant for admission at the end of the course of study of a particular term shall be eligible to appear at it, if,
- (i) He/She satisfied the conditions in the table and the provisions there under.
- (ii) He/She has prosecuted a regular course of study in this college.
- (iii) He/She has in the opinion of the Head of the Department/Principal shown satisfactory progress in his / her studies.

Sr. No	Course and Level	Type of Admission	Eligibility	Remark
1	MSc Semester-I	Direct Admission	As mentioned in Para-3	
2	MSc Semester-II	Natural Growth		
3	MSc Semeste-III	Natural Growth	Having Passed Minimum 50% of total passing heads collectively of MSc Semester-I and Semester-II	
5	MSc Semester IV	Natural Growth		

- 12. The papers and practical in which an examinee is to be examined. The maximum marks for these and the minimum pass marks which an examinee must obtain in order to pass in the subject and the examination shall be as per the curriculum.
- 13. (i) The scope of the subjects is as indicated in the syllabus.
 - (ii) The Medium of instruction and examination shall be English.
- 14. There shall be no classification of examinees successful in M.Sc. Semester –I, M.Sc. Semester–II, M.Sc. Semester-III and M.Sc. Semester-IV examination separately.
- 15. Examinees thosewho are successful in M.Sc. (Computer Science) Semester-IV Examination and all other three previous Semester examinations shall be declared passed and CGPA and programme grade will be computed as per the provision and rules of examinations under CBCS for this autonomous college.
- 16. An examinee who does not pass or who fails to present himself herself for the examination shall be eligible for readmission to the same examination, on payment of fresh fees and such other fees as may be prescribed.
- 17. As soon as possible after the examinations the Examination Committee shall publish a result of the examinees. The result of final M.Sc. Examination shall be declared as

Note: This syllabus is subject to change.Prg. Code: MSC2017M.Sc. (Comp. Sci.) Session (2017-2018)Pg.5

mentioned in para-15 above and merit list shall be notified as per the rules.

- 18. Not withstanding anything to the contrary in this rule no one shall be admitted to an examination under this rule, if he/ she has already passed the same examination or an equivalent examination of any statutory University.
- (i) The examinees who have passed in all the subject prescribed for all the examinations shall be eligible for award of the Degree of Master of Science (Computer Science) by S. G. B. Amravati University, Amravati.
 - (ii) The Degree Certificate in the prescribed from signed by the Honorable Vice- Chancellor of S. G. B. Amravati University, Amarvati.

Syllabus of First Year M. Sc. (Computer Science)

Semester I

Course Code		17MSC101	
Course Name		Digital System Design & Microprocessor	
Course Short		DSDM	
Name			
Total I	Lectures	60	
Total Credits 4			
Prerec	uisites :		
• Stu	idents should kr	now the number system, logic gates, flip-flops etc.	
• The	ey should know	the details about digital electronics.	
• Stu	ident should kno	ow the evolution stages of microprocessors.	
Course	e Objectives:		
• The	e main objective	e is to make students aware about the basic concept of digital elect	tronics.
• Stu	ident will unders	stand the architecture of advance microprocessor.	. Caluada a t
• 0b	jective of syllad	us is to increase the assembly language programming knowledge	of student.
Units		Contents	l otal
Т	Basics of dig	ital electronics · Digital and analog system voltage profile	12
1	functions of d	ligital logic : Arithmetic operations 1's and 2's compliment	12
	method, multi	plication by shift and add method, multiplexer as encoding, de	
	multiplexer as	decoder, counting, data transmission, Switching function(logic	
	gates) , Com	binational logic, Sequential circuit , flip-flop as a memory	
	cell/latch. Re	gister and Counters; shift register as storage, buffer, Counters;	
	Semiconductor	r memories : Memory expansion : word size and word length	
	expansion.		
II	Microprocess	or Architecture: Microprocessor based personal computer	12
	system. Introc	duction to Pentium processor, Internal Architecture of execution	
	unit of Pentiu	um processor, coprocessor/F.P. unit, cache memory, speed.	
	Software model/programming model, Processor flag, superscalar and		
TTT	pipelining, bra	nch prediction, Real mode & protected mode of Pentium.	10
111	Instruction s	set : Pentium Instruction and programming ; Data transfer	12
	group, string	manipulation instructions, Antimietic group, logical group, bit	
	nrogram based	d on these instructions	
ΤV		gramming and interrunt · EXTRN and PUBLIC directives	12
10	subroutines a	and procedures. MACRO design and expansion, memory	12
	management.	TSR program, interfacing C with ALP. Types of interrupts.	
	interrupt vect	or table, interrupt processing sequence, number conversion,	
	(ASCII, BCD,	Binary), DOS and BIOS function call for keyboard, display,	
	printer. Comm	and line interface.	
V	Protected m	ode operation: Detection of protected mode, protected mode	12
	operation, seg	mentation, paging, linear address conversion. Protection, Access	
	rights, multita:	sking, TSS, task switch, Privilege level, function of TLB.	
	Text Books:		
	1. AnandKum	ar, "Switching Theory and logic design", PHI.	
	2. James Ant	onakos, "The Pentium microprocessor", PEARSON	
	References :		
	1. R. P. Jain,	"Modern Digital Electronics", Mcgraw Hill	
	2. Ray and B	hurchundi, "The INTEL Microprocessor Architecture", Mcgraw Hill	
Course	e Outcomes:		
•	Ability to unde	rstand the basic concept of digital electronics.	
•	Students can p	prepare assemble program, ariver and control program for devices	•
•	Students awar	e about main components of digital system.	

Course	e Code	17MSC102	
Course Name		Data Structures and File Design	
Course Short Name		DSFD	
Total I	Lectures	60	
Total 0	Credits	4	
Prerec	quisites :		
• Kn	owledge of C and	C++	
Course	e Objectives:		
• <u>To</u>	o analyze the algorithms to determine time and space complexity.		
• 10	build and manip	pulate linear and non-linear data structure, including Stack, Arr	ay, Linked
	, Queues, Tree a	nu Graphs.	
• To	he able to choose	se the appropriate data structure to use in solving typical comput	ter science
pro	blem.	the appropriate data structure to use in solving typical compar	ter selence
Units		Contents	Total
			Lectures
Ι	Introduction,	Types of Data Structures: Linear & Nonlinear data structures,	12
	Abstract data ty	/pes.	
	Arrays: Linear	arrays, Memory Representation of linear Arrays, Operations on	
	Linear Arrays, N	Aultidimensional Arrays, Matrices, sparse matrices,	
	Applications.	ancent Operational Incert Delete Travercal Static	
	implementation	using Arrays, Dynamic implementation, Doubly Linked list	
	Circular linked	ist Linked list applications: Merging of two linked lists	
	File structure, F	ile Type, Records, Attribute.	
II	Stacks : Introd	luction to stack, primitive operation on stack, Stack	12
	implementation	using arrays and linked list.	
	Stack's applicat	ions - Infix, post fix & Prefix expressions, Infix to postfix	
	conversion, eva	luation of postfix expression, Recursion.	
	Queues : Intro	duction to queues, Primitive Operations on the Queues,	
	Queue applications: CPU Scheduling algorithms FCFS Round Robin		
	algorithm	Cations: CPO Scheduling algorithms FCFS, Round Robin	
III	Searching: Int	roduction to Searching and sorting. Concept and need, Linear	10
	search, Binary	search, Indexed sequential search, Sorting: Bubble sort,	
	Insertion Sort,	Selection Sort, Merging: Merge Sort, Radix Sort, Heap Sort.	
IV	Trees: Termino	ology and Concepts, Binary Tree. Representation, Linked	14
	representation	of binary trees, Binary Search Tree, Operations on Binary	
	Search trees: I	nsert, Delete. Tree Traversals: Preorder, Inorder, Postorder,	
	AVL Search Tre	es, B Trees.	
	list Adjacency	multi-list Traversals: Denth first and Breadth first	
	Minimum spann	ning tree, shortest path algorithm, topological ordering	
	Indexing and	Hashing: B-tree indexing, multilevel indexing, B+ tree.	
	Hashing, Collisi	on processing, Bucket hashing, dynamic hashing, Linear	
	Probing, Linear	hashing, Extendible hashing.	
V	File Concepts:	Files, Types of file : Master file, Transaction file, Work file,	12
	Text file, Binary	/ file, Program file, File processing operations : open, close,	
	read, write, see	K.	
		Inverted Files	
	Books :		
	1. Seymour Li	pschutz, "Data Structures",Tata McGraw Hill Education Private	
	Limited, NE	W DELHI.	
	2. SartajSahar	ni, "Data structure algorithms and Applications in C++",	
	McGraw Hill		
	References :		
	1. Tanenbaum	, Langsam, Augenstein, "Data structures using C", PHI	
	3. Mark Allan	Welss, "Data structures, Phi Welss, "Data structure and algorithm analysis in C++".	

	Addison Weslay	
	4. Bhagat Singh & T.L. Naps, "Introduction to Data Structures"	
	5. S.B.Kishor, "Data Structures"	
Course	e Outcomes:	
•	Ability to evaluate algorithms and data structures in terms of time and complexity operations.	/ of basic
•	Ability to analyze algorithms and a algorithm corrections, to describe stack, queue linked list.	e and
•	Knowledge of basic and dynamic data structures.	
•	Understands searching and sorting techniques	

Course Code		17MSC103		
Course Name		Object Oriented Programming using JAVA		
Course	Short	JAVA		
Name				
Total Le	ctures	60		
Total Cr	edits	4		
Prerequ	isites:	he familie with Ohiert Oriented Decements in a		
Stude Reside	ents should	be familiar with Object Oriented Programming.		
• To be	e able to exr	blain and implement basic Programming techniques		
 To lease 	arn basics of	f java language.		
• To im	nplement cla	sses, inheritance, interfaces, applets, graphics and AWT.		
To le	arn handling	g exceptions.		
Units		Contents	Total Lectures	
I	Java Bas Structure of Statement Method Ov	ics: History, Features, JDK, JVM, Difference between C++ & Java, of Java Program, Data Types, Operators & Expression, Decision Making s, Creating Classes & Objects, Constructor, Constructor Overloading, rerloading, Use of <i>new</i> , <i>delete</i> & <i>this</i> keywords.	12	
II	Inheritance, Package & Interface: Implementation of Inheritance, Super & Extended class, Abstract class & methods, Method Overriding, Final variables, methods & classes. Package concept, Creating user defined Packages, Java built-in Packages. Interface.12Interface concept, Defining & Implementing Interface.12			
III	Exception catch, Mult StringToke	Handling & Multithreading: Exception concept, types, Using try tiple catch, nested try, use of throw block.String class, String Buffer and enizer class and its method Multithreading concept, Thread Life cycle,	12	
IV	Applet & all attribu viewer, A Graphics of Ellipses, An	Graphics: Applet concept, Applet Life cycle, HTML Applet tag with tes, passingparameters to Applet, Displaying it using Applet dvantages & Disadvantages of Applet Vs Application. concept, Graphics class, Drawing Lines, Circle, Polygon, Rectangle, rcs, Working with colors.	12	
V	AWT: AWT Delegation Interfaces.	concept, AWT components, Containers, Frames & Panels, Event Model, Event source & Handler, Event categories, Listeners &	12	
	Books:			
	1. Herber	t Schildt, "Complete Reference Java2", TMH		
	Reference1. E. Bala2. Dietel 83. D. R. C4. Steven	es: gurusamy, "Programming with Java", TMH & Dietel, "Java How to Program",Pearson Collaway, "Inside Servlets", Pearson Holzner, "Java2 Programming Black Book", DreamTech Press		
Course (• •	Ability to Skill to w Understa Exception	identify and implement Object Oriented concepts in programming. rite java application programs using OOP principles, applet programming. Inding of the concepts of polymorphism and inheritance principles of Inter n Handling, Applets, Graphics Programming, Java Imaging and Generic	face,	

Programming

Note: This syllabus is subject to change.

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Course	e Code	17MSC104		
Course Name		Data Communication Networks		
Course Short		DCN		
Name				
Total	Lectures	60		
Total	Credits	4		
Prerec	uisites :			
• Kn	owledge of com	puter network and types of communication network.		
DII Erc	auency modula	tion techniques		
Course	e Objectives:	tion techniques.		
• To	understand the	role of Computer Network.		
• To	learn the Netwo	ork's OSI Models and different protocols used in its layers.		
• To	understand the	routing and Multimedia Networking.		
Units		Contents	Total	
- T	T	Determination Natural Company of data	Lectures	
1	Introduction	Data communication Network, Component of data	12	
	Transmission	Media: Conner Wires Glass Fibers Radio Satellite		
	Geosynchrono	us. Satellite. Low earth Orbit Satellite array. Microwaye.		
	Infrared.			
	Local Asyn	chronous Communication: The need of asynchronous		
	Communicatio	n, Baud Rate, Framing, and Error, Full Duplex Asynchronous		
TT	Communicatio	n. ta OCT Madala Javara ef OCT Madal	10	
11	Application	to USI Model: Layers of USI Model.	12	
	Web: HTTP.	File Transfer: FTP. The Internet's Directory Service: DNS.		
	Internets Direc	ctory Services.		
	Transport La	ayer: Transport-Layer Services and Principles, Principles of		
	Reliable of Data Transfer, Connection-Oriented Transport: TCP, Principles of			
	Congestion Co	ntrol	12	
111	Routing Principles, Broadcast and multicast routing, Routing Algorithms			
	Internet Protocol: IP Design, IP Addressing, IP Fragmentation, introduction			
	to IPv6.			
IV	Link Laver a	nd Local Area Networks: The Data Link Laver: Introduction.	12	
	Services, Erro	r Detection and Correction, Multiple Access Protocols and LANs,		
	Ethernet, CSM	A/CD,Hubs, Bridges and Switches		
	Wireless LAN	Is: IEEE 802.11 wireless LAN's , The Point-to-Point Protocol		
V	Multimedia	Networking: Multimedia Networking Applications, Streaming	12	
	Stored Audio	and Video, Protocols for Real Time Interactive Application,		
	Scheduling and	Computer Networks: Introduction to Network Security		
	Principles of	Cryptography, Authentication, Integrity Key Distribution and		
	Certification, A	Access Control: Firewalls, Attacks and Countermeasures.		
	Text Books:			
	1. James F. ł	Kurose and Keith W. Ross, "Computer Networking: A Top-Down		
	Approach I	Featuring the Internet", Pearson Education.		
	2. Jerry Fitzg	gerald and Alan Dennis, "Business Data Communications and		
	Networking	g", Eighth Edition, Wiley Publication, India.		
	References :			
	1. Behrouz A	A. Forouzan, "Data Communications and Networking", Fourth		
	2. V B Black	"Data Communications and distributed Networks"		
Course	e Outcomes:			
•	Student will ur	nderstand the concept of computer network technology.		
•	Ability to ident	ify the different types of network topologies and protocols.		
•	Knlowledge ab	out OSI model, threats in network and Counter measures.		

Note: This syllabus is subject to change.

Prg. Code: MSC2017

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Course Code 17MSC105				
e Name	System Software			
e Short	SS			
Lectures	60			
Credits	4			
quisites :				
sics knowledge (of computer architecture and C programming.			
e Objectives:				
understand the	relationship between system software and machine architecture			
understand the	process of scanning and parsing.			
know the design	n and implementation of assemblers, linker and complier.			
he able to trace	the path of source code to object code and to the executable file.			
		Total		
	contents	Lectures		
System Softy	ware: Introduction types of system software loaders and	12		
linkers. Re loca	ation, linkage editors, dynamic linking.	12		
Types of Tran	nslators:			
Compiler:Intr	oduction, phases of compilation, lexical analysis, parsing,			
comparison be	tween Compiler and Interpreter.			
Assembler:	basic assembler function, One pass assembler, Two pass			
assembler, Mu	Iti pass assembler.			
Process Man	agement: Definition of process state, process state transition,	10		
operation on p	process, PCB, process scheduling, CPU scheduling, Inter process			
Memory man	agement: Swapping, single, multiple partition allocation	10		
compaction n	agement: Swapping, single, multiple partition allocation,	12		
segmentation.	paged segmentation. Virtual memory management: Virtual			
memory, dema	and paging, page replacement, page replacement policies, FIFO,			
LRU algorithm	, allocation of frames, thrashing.			
Device Mana	gement: The buffer cache, buffer headers, structure of buffer	12		
port, retrieval of buffer, buffer allocation, finding buffer, releasing buffer,				
reading & writ	ing disk block. I/O Hardware, application I/O interface, kernel			
I/O sub system	n, Disk scheduling & management, swap-space management.	1 4		
Case study:	Linux OS: Introduction of Linux O.S., Design principle, kernel	14		
system Socur	ity			
Text Books	ity.			
1. A. Silbers	schatz, P.B. Galvin, "Operating system Concepts", Wiley			
publication				
2. D.M Dham	ndhere. "System software and operating system"			
3. Alfred V A	ho. Jeffery Ullman."Principle of compiler design"			
4 HM Dieto	1 "Onerating system"			
5 Maurico 1	Rech "The Design of LINIX Operating System"			
Deferences :	been, the besign of onur operating system .			
1 A S Tanan	hum "Operating System" Person Education			
2. William Sta	allings, "Operating System", Prentice Hall.			
3. Crowly, "O	perating System", TMH.			
4. M. Milankovic, "Operating System", McGraw-Hill.				
e Outcomes:				
Student will ab	ble to understand compilation and execution of a program.			
Understand the	e system behavior and system architecture. Also how to deal with	the error		
condition.	retand how to doal with input output douting property			
	rstand now to deal with input output devices properly.			
it iowieuge of (opensource opearating system i.e. Linux			
	e Code e Name e Short Lectures Credits guisites : sics knowledge e Objectives: understand the understand the understand the know the desig have an unders be able to trace System Softv linkers, Re loc. Types of Trai Compiler: Intr comparison be Assembler: assembler: assembler: Mu Process Man operation on p communication Memory man compaction, p segmentation, memory, dem LRU algorithm Device Mana port, retrieval reading & writ I/O sub syster Case study: modulus, pro system, Secur Text Books: 1. A. Silbers publicatior 2. D.M. Dhan 3. Alfred V. A 4. H.M. Diete 5. Maurice J. References : 1. A.S. Tanar 2. William Sta 3. Crowly, "O 4. M. Milanko e Outcomes: Student will at Understand the condition. Ability to unde Knowledge of a	e Code 17MSC105 e Name System Software e Short SS Lectures 60 Credits 4 quisites : siscs knowledge of computer architecture and C programming. e Objectives: understand the relationship between system software and machine architecture understand the process of scanning and parsing. know the design and implementation of assemblers, linker and compiler. have an understanding of loader, system software tools. be able to trace the path of source code to object code and to the executable file. Contents System Software: Inkers, Re location, linkage editors, dynamic linking. Types of Translators: Compiler: Compiler: Process Management: Porcess Management: Process Management: Process Management: Seynemunication, scheduling criteria and algorithms. Memory management: Seynemunication, paging spingle, multiple partition allocation, compaction, paging, implementation of page table, segmentation, paged segmentation, paged segmentation of frames, thrashing. Device Management: Nerflex cache, buffer headers, structure of buffer patalcemeth policies, FIFO, LRU		

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Course Code	17MSC106		
Course Name	Computer Lab 1 (Based on 17MSC102: DSFD)		
Course Short	CL1		
Name			
Total Lectures	45		
Total Credits	3		
Practical List will be freshly prepared by subject teacher in every session. So the list is			
not mentioned.			
•			

Course Code	17MSC107		
Course Name	Computer Lab 2 (Based on 17MSC103: JAVA)		
Course Short	CL2		
Name			
Total Lectures	45		
Total Credits	3		
Practical List will be freshly prepared by subject teacher in every session. So the list is			
not mentioned.			

Course Code		17MSC108			
Course Name		Computer Lab 3 (Based on LINUX & ALP)			
Course S	Short	CL3			
Name					
Total Le	ctures	90			
Total Cr	edits	6			
Prerequ	isites:				
Stud	ents should be	e aware about high level language "C", Network concept and Messaging.			
Course		le to understand Linux Onerating System. Chall programming and use			
 Stude vario 	us Notwork of	ommands			
Vario	us network ct	Jinnanas.			
Sr. No.		Contents			
1	What is Linu	x Linux Architecture System Boot up Linux system commands: ls passwd			
1.	whoamI use	ers vi cat we en my rm ed nwd mkdir rmdir ed echo man date File			
	managemen	t : file permission, file access modes: read, write, execute, chmod, chown,			
	charp, command, path, pr, mail, ps, kill, Pipes and filters, sort command.				
2.	The vi / vim editor, Shell scripting: what is shell, shell commands, defining , using				
	accessing variables, unset, types of variables, Linux shell basic operators, Arithmetic				
	operators (+, -, *, /, %, =, ==, !=), relational(-eq, -ne, -gt, -lt, -ge, -le , Boolean (!, -				
	o, -a,) string operator(=, !=, -z, -n, str), using array,				
	Linux shell decision making; The "ifelse", "iffi", "ifelse, fi", " ifelfielsefi", "				
	caseesac".				
	Linux shell lo	pop; "while", " for", "until", " select", nesting loop, break, continue, I/O			
	redirection,	shell function, pass parameter, return values, nested call, Programs on			
	above reatur	es. Amand Communication: ning, tolnot utility, currito, talk, mcg, condall			
3	Solving C pr	agrams on Linux onvironment			
5.	Solving C pr				
List of A	I P program	s based on Digital system design & microprocessor (17MSC101)			
1 Write	an ALP to coa	rch for the higgest no. from ton 16 hit noc			
2 Write	an ALP to sea	arch for the small no from ten 16 hit nos			
3. Write	Write an ALP to search for the given no				
4. Write	4. Write an ALP to add ten 16 bit nos, store 32 bit sum to memory.				
5. Write	5. Write an ALP to add ten 8 bit BCD nos. Store BCD sum to memory.				
6. Write	6. Write an ALP to sort ten 16 bit nos in ascending order.				
7. Write	7. Write an ALP to to count for even nos and odd nos from given ten 16 bit nos.				
8. Write	an ALP to cou	nt for 1's condition from ten 16 b it nos. store count in array.			
9. Write	an ALP for mu	Itiplication two 8 bit nos. Store 16 bit result in the memory.			
10. Write	e an ALP for di	vision operation.			

Syllabus of First Year M. Sc. (Comp. Sci.)

Semester II

Course Code 17MSC110			
Course Name Database Management System			
Course Short DBMS			
Name			
Total	Lectures	60	
Total (Credits	4	
Prerec	quisites :		
Course	e Objectives:		
l● Un	derstand the rol	e of a database management system in an organization.	C 11
• Un	derstand basic	database concepts, including the structure and operatio	n of the
rei	ational data moo	Jel. nd moderately advanced database queries using Structured Query	
• C0	וואנו עכנ אוווףופ מ	nu moderately advanced database queries using Structured Query	Language
	JL). derstand and si	iccessfully apply logical database design principles including E-E	diagrams
	d database norm	nalization.	(alagrams
• Un	derstand the co	procept of a database transaction and related database facilities	. including
cor	ncurrency contro	b), backup and recovery, and data object locking and protocols.	, merading
Units		Contents	Total
			Lectures
Ι	Introduction	DBMS, Advantages, View of Data, Database System	12
	Applications.		
	Database-Lar	nguages:- DDL,DML,DCL,TCL.	
	Overview of	Physical Storage Media: Magnetic Disks, RAID, Tertiary	
	storage. File	Organization: Organization of Records in Files, Indexing and	
	Hashing: Ord	lered Indices, B+ tree Index Files, B tree Index Files, Static	
TT	Hashing, Dyna	mic Hashing. En Satisfica estatistica estatistica estatistica estatistica estatistica estatistica estatistica estatistica e	10
11	Entity-Relation	in acta Delational Algobra . Salast Draiast Set theory Join	12
		ip sets. Relational Algebra: Select, Project, Set theory, Join,	
	SOL: Basic str	aucture set operations. Aggregate functions, null values, pested	
	sub queries vi	iews functions cursors triggers stored procedure	
TIT	Relational Da	atabase Design: Decomposition Normalization using functional	12
	dependencies.	Normalization using join dependencies, domain key normal	12
	form, and alte	ernate keys approaches to database. Converting ER Model to	
	Relational Mod	el.	
IV	Transaction	management:-The ACID properties, transactions and	12
	schedules, cur	rent execution of transactions, concurrency control.	
	Integrity Con	straints: Domain constraints, referential integrity.	
V	Introduction	to Database security: Access control, Discretionary access	12
	control, Manda	itory access control.	
	Intoduction	to Advance databases: Introduction to centralized system,	
	Types of Date	ySterri.	
	Text Booker		
	1 Ahraham	Silherschatz Henry F Korth S Sudarshan Database System	
	Concent F	ifth edition. McGraw-Hill, 2006	
	2. Radhu R	amkrishnan, Johannes Gehrke, Database Management	
	system.Thi	ird Edition McGraw-Hill, 2003	
	3. C. J. Date,	An Introduction to Databae system, Third Edition Vol. 1, Narosa	
	publishing	House, 1998	
	References:		
	1. Jeffrey A. I	Hoffer, Marry B. Presscott, Fred R. McFadden, Modern Database	
	Mangemen	t, Pearson publication, 6 th edition.	

Degree College of Ph	vsical Education. An Autono	omous College, Shree H	. V. P. Mandal, Amravati.
200.00 00.000	10.000 = 200.000		

	2.	Thomos Canolly, Carolyn Begg, Database system-A practical approach to design, Implementation and management, Pearson publication, 4 th edition.	
^	•		

Course Outcomes:

- Ability to describe data models and schemas in DBMS ٠
- Acquire knowledge about the features of database management systems and Relational • database.
- •
- Able to use SQL; the standard language of relational databases. Ability to understand the functional dependencies and design of the database. •

Course	e Code	17MSC111	
Course	e Name	Mathematical Foundation	
Course	e Short Name	MF	
Total	Lectures	60	
Total (Credits	4	
Prerec	quisites :		
Bas	sic concept of Ma	thematical Logic, Connective, Knowledge of derivatives, integration	on,
ma	trix, basic knowl	edge of data structure like tree, stack, array, queue, etc.	
Course	e Objectives:		
• To	understand and	l be able to use fundamental concept of mathematics in con	nputational
SCI	ence.	the basic concept of Mathematical modeling	
• 10 • To	make students a	I the basic concept of Mathematical modeling.	no roal life
	hleme	the to apply mathematical and statistical techniques to solve sol	ne rear me
• To	acquire knowled	ge of Numerical Computation	
Units		Contents	Total
0			Lectures
Ι	Mathematical	Logic: Introduction to Discrete mathematics Proposition,	13
	Connectives, Co	onditional and Biconditional Proposition, Normal Forms,	
	Disjunctive and	Conjunctive Normal Form and Principles. Set Theory: Basic	
	concepts and N	otation, Ordered pairs and Cartesian Products. Relation :	
	Types of relation	n, operations on relation, Properties of relation, Hasse	
	diagrams for pa	artial orderings.	
II	Function: Repr	resentation of function, Classification of Function, types of	13
	function. Lattic	ce: Properties of Lattice, Principle of Duality, Properties of	
	Lattices.	Taba dusting to Caral. Matrix associate the offer small	
	Graph Theory	Introduction to Graph, Matrix representation of a graph,	
	state machine v	with no output	
TTT	Computer Arit	marine output.	10
111	Computations	Floating-point representation of numbers, arithmetic operations	10
	with normalized	I floating point numbers and their consequences.	
	Iterative Meth	nods: Bisection, False position, Newton-Raphson methods,	
	Secant method	· · · · · · · · · · · · · · · · · · ·	
IV	Matrices: Matr	ix operations, transpose of matrix, inverse of matrix, rank of a	12
	matrix, Solutio	on of linear system: Matrix Inversion method, Gaussian	
	elimination Met	hod, Method of Factorization, The Gauss Seidel iterative	
	method		
V	Interpolation:	Introduction, Lagrange Interpolation, Difference Tables,	12
	Iruncation Erro	r in Interpolation, Spline Interpolation, Numerical	
	Sorios mothod	Rungo kutta method	
	Text Books :	Kunge-kutta methou.	
	1. T Veerara	ian. "Discrete mathematics with graph theory and	
	combinatori	cs." McGraw Hill Education	
	2. V. Rajarama	an, "Computer Oriented Numerical Methods", Third Edition, PHI.	
	References :		
	1. Steven C. C	hapra, Raymond P. Canale, "Numerical Methods for Engineers",	
	Tata McGrav	w Hill.	
	2. M.Goyal, "C	omputer Based Numerical & Statistical Techniques", ISP	
	3. J.P.Trembla	y, R. Manohar, "Discrete mathematical structures with	
	applications	io computer science, imini	
	Computer se	sience"PHI	
	5. S. S. Sastr	v. "Introductory Methods of Numerical Analysis" Fifth Edition	
	PHI		
Course	e Outcomes:		
•	Ability to apply	mathematical and statistical techniques to solve some real life pr	oblems.

• Students are able to apply mathematical techniques for data analysis.

- Understand the basic principles of sets and operations in sets.
- Model problems in Computer Science using graphs and trees.

Course	Code	17MSC112	
Course	Name	Computer Graphics	
Course	Short	CG	
Total Le	ctures	60	
Total Cr	edits	4	
Prerequ	isites:		
Basic	: Knowledge	about computer system, it's components and function.	
Course	Objectives:		
• load	cquire the ba	asic knowledge about Computer Graphics.	
• TO IE	am dasic kn		Total
Units		contents	Lectures
I	Introduct Application Coordinate Rendering,	ion to Computer Graphics: Introduction, Types, Characteristics, a, Advantage, Input Devices, Hard copy devices, Graphics Software, e Representation, Software Standards, computer graphics metafile, a Image Resolution.	10
II	Video Dis CRT Monito	play Devices: CRT , Raster scan display, Random scan display, Color ors, Virtual Reality System	14
	Output Pr Algorithm, Filled Are Algorithm,	imitives: Points and Line, DDA Algorithms, Bresenham's Line Circle Generating Algorithms, Midpoint Circle Algorithm a Primitives: Scan Line, Polygon Fill Algorithm, Boundary Fill Character Generation.	
III	Attributes Area Fill At 2D Geome Scaling).Ge Shear 2Dimensio Transforma	s of Output Primitives : Line Attributes, Curve Attributes, Color Table, tributes, Character Attributes, Bundled Attributes etric Transformation : Basic Transformation (Translation, Rotation eneral Pivot Point Rotation, General Fixed Point Scaling, Reflection onal Viewing : Viewing Pipeline, Windows to Viewport Coordinate ation.	12
IV	Clipping: Clipping, S Structure	Point Clipping, Line Clipping, Cohen-Sutherland Line Clipping, Polygon Sutherland-Hodgeman Polygon Clipping Text Clipping, Exterior Clipping. Basic Structure Function, Editing Structure Function.	12
V	GUI and in Input Device Three Din Blobby Obj	nteractive Input Method: User Dialogue, Logical Classification of ces. Interactive Picture Construction Techniques nensional Concepts: 3Dimensional Display Methods, Polygon Table, ject, Bezier Curve, B-Spline Curve.	12
	Text Book	(S:	
	2. Donald	Hearn & M.P.Baker: Computer Graphics 2/e(PHI)	
	5. S.Harri	es: ington : Computer Graphics : A programming Approach (McGraw Hills) : Procedural Elements for Computer Graphics (McGraw Hills)	
Course	Outcomes:		1
 Abilit Abilit Knov 	ty to draw gi ty to perform vlegde about	raphics using line, curves, and polygon. n operations on computer graphics. t 2Dimentional and 3Dimentional display methods.	

Course	e Code	17MSC113	
Course	e Name	Artificial Intelligence and Expert System	
Course	e Short	AIES	
Name			
Total I	ectures	60	
Total C	Credits	4	
Prerec	juisites :	f control tochniques, logic & reaconing	
		i search techniques, logic & reasoning.	
• To	understand the	Concepts of Artificial Intelligence & Expert System.	
• To	Study & unders	tand role of knowledge in AI & its representation.	
• To	understand App	plications & research areas of AI.	
• To	understand Exp	ert Systems.	
Units		Contents	Total
			Lectures
1	General Issu	ies and overview of AI: The AI problems: what is an AI	12
	technique, Ch	aracteristics of AI applications, Problem Solving, Search and	
	control Strate	egies, General Problem solving, Production systems; Control	
	and Breadth fi	rst search	
II	ITSP: Introdu	uction to LISP Syntax and numeric functions Basic list	12
	manipulation f	functions in LISP, Functions, Predicates and conditionals, Input	
	Output and loc	cal variables, Iteration and recursion, property list and array.	
III	Learning: D	efinitions, Types of learning, A paradigm of Learning,	12
	Classification	of Learning Strategies, Model for Machine Learning, Learning	
	Framework, Ge	enetic Algorithm.	
	Knowledge R	Representation: Knowledge Representation Issues, Approaches	
	to knowledge	Representation, Representing simple facts in logic, Procedural Vs	
τv			17
10	Hill climbing. F	Branch and Bound technique. Best first search and A* algorithm.	12
	AND/OR Graph	ns, Problem reduction and AO* algorithm, Constraint Satisfaction	
	problems, Ga	me Playing Min Max Search procedure, Alpha-Beta cutoff;	
	Additional Refi	nements. Applications of Search techniques	
V	Reasoning:	Monotonic and non-monotonic reasoning, limitations, Default	12
	reasoning, circ	cumscription, Probability theory, Probability based reasoning and	
	uncertainty.	The state of the second construction of the state of the second sec	
	Expert Syste	ems: Introduction to Expert Systems, Architecture of Expert	
	Text Books	Strate States.	
	3. Foundation	ns of AI and Expert sytems: V.S. Jankiraman, K.kureshi, P.Gopal	
	Krishnan (I	Macmillan series).	
	4. Introductio	on to AI and Expert systems: Dan W. Patterson, PHI	
	References :		
	3. AI and Inte	elligent Systems: N.P.Padhy, Oxford.	
	4. Artificial in	telligence A Practical approach: Er. Rajiv Chopra (S.Chand)	
Course	e Outcomes:	·· · · · · · · · · · · · · · · · · · ·	
•	Knowledge of A	AI and expert system.	
•	Know the conc	ept List Processing, Knowledge representation.	
•	Applications of	AI for designing the expert system.	

Course	e Code	17MSC114	
Course	e Name	Parallel and Distributed Computing	
Course	e Short	PDC	
Name			
Total I	ectures	60	
Total C	Credits	4	
Prerec	uisites :	the basis knowledge of computer prohitecture	
Stu	ident must nave	f computer processing	
• To	provide student	s with contemporary knowledge in parallel and distributed systems	s.
• To	equip students	with skills to analyze and design parallel and distributed applicatio	ns.
• To	provide master	skills to measure the performance of parallel and distributed algor	ithms.
Units		Contents	Total
			Lectures
I	Parallel Com	puting: Parallel Architecture, Architectural Classification	12
	Scheme, Perfo	rmance of Parallel Computers, Performance Metrics for	
	Processors, Pa	rallel Programming Models, Parallel Algorithms.	12
11	Pipeline Pro	ocessing: Introduction, Pipeline Performance, Arithmetic	12
	Dynamic Instr	uction Scheduling	
TIT	Synchronous	Parallel Processing: Introduction, Example-SIMD Architecture	12
	and Programm	ning Principles, SIMD Parallel Algorithms, Data Mapping and	
	memory in arr	ay processors, Case studies of SIMD parallel Processors.	
IV	Introduction	to Distributed Systems: Definition, Issues, Goals, Types of	12
	distributed sys	stems, Distributed System Models, Hardware concepts, Software	
	model	ers of Middleware, Services offered by Middleware, Chefic Server	
V	Communicati	ion: Lavered Protocols, Remote Procedure Call, Remote Object	12
•	Invocation, Me	essage Oriented Communication, Stream Oriented	
	Communicatio	n.	
	Text Books:		
	6. Advanced	Computer Architecture (A Practical Approach) by Rajiv Chopra.	
	7. Introductio	on to the Parallel Processing by M.Sasikumar, Dinesh Shikhare	
	and P.Ravi	Prakash.	
	5 Fundament	tal of Parallel Computing by Sanjay Razdan	
	6. Introductio	on to Parallel Computing by Sanja's Razaan.	
	George Ka	rypis, Vipin Kumar.	
Course	e Outcomes:		
•	Ability to deve	lop Parallel application using parallel programming model and algo	rithms.
•	Know the conc	ept of pipeline processing.	

• Ability to develop distributed application by using RPC, RMI Technology etc.

Course Code	17MSC115
Course Name	Computer Lab 1 (Based on 17MSC110: DBMS)
Course Short	CL1
Name	
Total Lectures	45

Degree College of Physical Education, An Autonomous College, Shree H. V. P. Mandal, Amravati.

Total	Credits	
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Practica	I List will be freshly prepared by subject teacher in every session. So the	e list is
not men	itioned.	

Course Code	17MSC116
Course Name	Computer Lab 2 (Based on 17MSC112: CG)
Course Short Name	CL2
Total Lectures	45
Total Credits	3
Practical List will be not mentioned.	freshly prepared by subject teacher in every session. So the list is
÷	

Course Code	17MSC117
Course Name	Computer Lab 3 (Based on .NET Technology)
Course Short	CL3
Name	
Total Lectures	90
Total Credits	6
Prerequisites :	
 Knowledge of OOP 	concepts and Web application,
 Various scripting la 	anguages : VBScript, JavaScript
 Knowledge of C# L 	anguage: Variables, Data Types, Operators, Converting between Data

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Types, Constants, Introduction to Classes, Objects and Methods. **Course Objectives** To learn the fundamentals of designing, deploying and implementing Web applications. Use different server controls to create interactive web sites. Use different techniques of State Management. Access data from the database in data bound controls on the web page. To be able to use disconnected and connected ADO.Net objects. To learn the C# fundamentals and handling files. Create Web services To learn Crystal Reports, Ajax, Jquery, Silverlight, Sharepoint, WCF, WPF, WF, MVC Sr. No. Contents Basic Web Controls (Textbox, Buttons, Imagebuttons, LinkButton, Hyperlink, 1. DropDownList, ListBox, RadioButtonList, CheckBoxList, BulletedList, FileUpload, etc.), Rich Controls (Calendars, Ad Rotators), Validation Controls (Required Field, Comparison, Range, RegularExpression, Custom, Compare, ValidationSummary), Navigation Controls (TreeView, Menu, SiteMapPath), Login Controls (CreateUserWizard, Login, LoginStatus, LoginName, ChangePassword). Creating namespace, ASP.Net Core objects, State Handling (Application State, Session State, ViewState). 2. Introduction to ADO.NET, Connected & Disconnected Data objects. Using SQL Stored Procedures, Working with XML. 3. Using Data Controls like Datagrid, Repeater, Datalist. Working with File System (Using Files, Directories and Serialization), Building and using 4. Web Service, Debugging and Error Handling, Deployment. 5. Introduction to Crystal Reports, Ajax, Jquery, Silverlight, Sharepoint, WCF, WPF, WF, MVC. 6. Text Books : 1. Beginning ASP.NET using C#, Wrox, Authors: Chris Ullman Chris Goode, Juan T. Llibre, Ollie Cornes 2. ASP.NET 2.0 Black Book, dreamtech Press, Authors: Charul Shukla, Anil Kumar Barnwal 3. The Complete Reference C#, Tata McGrawl - Hill, Author: Herbert Schildt 4. ASP.NET 2005 using C#, BPB publications 5. Magic of ASP.Net with C#, Firewall Media, Authors: Shibi Panikkar, Kumar Sanjeev **References** : 1. .NET Framework Essentials, OREILLY, Authors: Thuan Thai & Hoang Q. Lam 2. ADO.NET Cookbook, O'REILLY, Author: Bill Hamilton 3. Learning C#2005, Second Edition, Oreilly, Authors: Jesse Liberty, Brian MacDonald

Shree H. V. P. Mandal's

Degree College of Physical Education, Amravati.

(Multi-faculty Autonomous College)

FACULTY OF SCIENCE AND TECHNOLOGY

(SCIENCE GROUP)



CURRICULUM SCHEME AND

SYLLABUS OF

SECOND YEAR

MASTER OF SCIENCE (COMPUTER SCIENCE)

(Choice Based Credit System)

Program Code: MSC2017

Introduced from the Session 2017-2018

Degree College of Physical Education,

(Multi-faculty Autonomous College)

SPECIAL NOTE FOR THE STUDENTS

1) This is notified for general information and guidance of all concerned for admission and examination to Master of Science in Computer Science.

2) All the students desirous to take examinations for which this prospectus has been prescribed should if found necessary for any other information regarding examinations etc. refer the examination rules of this autonomous college.

Pattern of Question Papers for Semester/Final Examinations of

MSc Programme in Choice Based Credit System

For Theory Examination

- 7. Under the CBCS curriculum, the semester/final theory examination shall be conducted for each course (Subject) as per the schedule declared by the Examination Section.
- 8. The question paper shall be of maximum 70 marks, containing ten questions, two questions on each unit and students are required to attempt any one of two.
- 9. No objective type multiple choices question allowed.
- 10. Every question will be of fourteen marks and may contain sub questions. Distribution of marks shall be given on the right of each question.
- 11. The questions' numbering will be as follows: Q. 1: or Q. 2:, Q. 3: or Q. 4:, Q. 5 or Q. 6, Q. 7 or Q. 8, Q. 9 or Q.10

Note: This syllabus is subject to change.	Prg. Code: MSC2017	M.Sc. (Comp. Sci.) Session (2017-2018)	Pg.26
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12. The question shall be target to evaluate knowledge, skill, thinking ability and application. Weightage shall be given in decreasing order of Knowledge, thinking ability, application and skill.

For Practical Examination

- 5. Question paper for practical examination will be of 20 Marks, two questions of ten marks each.
- 6. Question number one shall contain six problems/programs/experiments and student attempt any two out of these questions.
- 7. Question number two contain two sub questions (a) and (b) each of five mark.
- Question number 2(a) contain five MCQ. Question number 2(b) contain one logical question/problem to test students' ability of solving problems (Setter may ask to solve real life problems based on case study)

Examination Leading to the Degree of Master of Science (Computer Science) (Bi-annual Pattern) (Two Year Course)

Whereas, it is expedient to prepare a new rule for Examination leading to the Degree of Master of Science (Computer Science) (Bi-annual) (Two Year Course) under CBCS for the purposes hereinafter appearing in the Academic Board and Board of Management.

- 20. This Rule may be called "Examination Leading to the Degree of Master of Science (Computer Science) (Bi-Annual Pattern) (Two Year Course) CBCS.
- 21. This rule shall come into force w.e.f. the Session 2017-18 for the Degree of Master of Science (Computer Science) (Bi-Annual Pattern) (Two Year Course) under CBCS.
- 22. Subject to their compliance with the provisions rules in force from time to time. The following person shall be eligible for admission to M.Sc. first year (Computer Science).
 - a) A person who has passed the degree of Bachelor of Science of any statutory University with Computer Science / Computer Application as one of the subjects.

OR

b) A Person who has passed B.A. / B.Sc. with Mathematics plus post Graduate Diploma in Computer Science of S.G.B. Amravati University.

OR

- c) A person who has passed a Degree of bachelor of Computer Science.
- 23. A person who has passed M.Sc. First Year Computer Science of this Autonomous college or any other affiliated colleges of S.G.B. Amravati University shall be eligible for admission to M.Sc. Second Year (Computer Science).
- 24. The Degree of Master of Science (Computer Science) shall be awarded to an examinee who, in accordance with the provisions of this rule qualifies for the degree.
- 25. Duration of the Programme shall be two academic Years. The First Year M.Sc. (Computer Science) divided into two semesters called as Semester I, Semester II. The Second Year M.Sc. (Computer Science) also divided into two semesters called as Semester III and Semester IV. The College shall hold Examination in Winter and in Summer every year for both the even and odd semester.
- 26. The regular Examination of Semester–I and Semester- III shall be conducted in winter & the regular Examination of Semester- II and Semester- IV shall be conducted in summer every year. Supplementary Examination for Semester– I and Semester- III shall be held in summer and the supplementary examination for Semester–II and Semester-IV shall be

held in winter every year.

- 27. For purpose of instructions and Examinations the students shall study sequentially.
- 28. The period of academic session / term shall be such as may be notified by this Autonomous College.
- 29. The Examinations as given in Para 7 above shall be held at such dates as may be notified by this autonomous college.
- 30. Subjects to his/her compliance with the provision of this rule and of other rules pertaining to examinations in force from time to time the applicant for admission at the end of the course of study of a particular term shall be eligible to appear at it, if,
- (iv) He/She satisfied the conditions in the table and the provisions there under.
- (v) He/She has prosecuted a regular course of study in this college.
- (vi) He/She has in the opinion of the Head of the Department/Principal shown satisfactory progress in his / her studies.

Sr. No	Course and Level	Type of Admission	Eligibility	Remark
1	MSc Semester-I	Direct Admission	As mentioned in Para-3	
2	MSc Semester-II	Natural Growth		
3	MSc Semeste-III	Natural Growth	Having Passed Minimum 50% of total passing heads collectively of MSc Semester-I and Semester-II	
5	MSc Semester IV	Natural Growth		

- 31. The papers and practical in which an examinee is to be examined. The maximum marks for these and the minimum pass marks which an examinee must obtain in order to pass in the subject and the examination shall be as per the curriculum.
- 32. (i) The scope of the subjects is as indicated in the syllabus.
 - (ii) The Medium of instruction and examination shall be English.
- 33. There shall be no classification of examinees successful in M.Sc. Semester –I, M.Sc. Semester–II, M.Sc. Semester-IV examination separately.
- 34. Examinees those who are successful in M.Sc. (Computer Science) Semester-IV Examination and all other three previous Semester examinations shall be declared passed and CGPA and programme grade will be computed as per the provision and rules of examinations under CBCS for this autonomous college.
- 35. An examinee who does not pass or who fails to present himself herself for the examination

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shall be eligible for readmission to the same examination, on payment of fresh fees and such other fees as may be prescribed.

- 36. As soon as possible after the examinations the Examination Committee shall publish a result of the examinees. The result of final M.Sc. Examination shall be declared as mentioned in para-15 above and merit list shall be notified as per the rules.
- 37. Notwithstanding anything to the contrary in this rule no one shall be admitted to an examination under this rule, if he/ she has already passed the same examination or an equivalent examination of any statutory University.
- 38. (i) The examinees who have passed in all the subject prescribed for all the examinations shall be eligible for award of the Degree of Master of Science (Computer Science) by S. G. B. Amravati University, Amravati.
 - (ii) The Degree Certificate in the prescribed from signed by the Honorable Vice- Chancellor of S. G. B. Amravati University, Amravati.

This page is for Curriculum Scheme for SYMSC Semester-III

This page is for Curriculum Scheme for SYMSC Semester-IV

Second Year M. Sc. (Computer Science) Semester -III

Course	e Code 17MSC201			
Course	e Name Software Engineering			
Course	se Short SE			
Name				
Total	I Lectures 60			
Total	Credits 4			
Prerec	uisites:			
• Ba	sics concepts o	f System Development Life Cycle.		
Course	e Objectives:			
• To	Study software	e engineering methods, models and Processes.		
• To	explain the imp	portance of process visibility.		
• 10 Units	Contents	notion of professional responsibility.	Total	
			Lectures	
Ι	Software En	gineering Fundamentals: Evolving role of Software. Software	12	
	crises & myths. Software Engineering. Software process & process models:			
	Object Oriented, RAD model. Product &Process. Project management concepts			
	: People, Product,			
	Process, Project. WSHH principle.			
II	Measures, Metrics & Indicators. Metrics for software quality,. Software projects 12		12	
	Planning: Scope, resources, estimation, decomposition technique, Tools.			
	Software risks : identification, risk projection, refinement & RMMM plan.			
III	Project Sche	eduling: Scheduling. EV analysis, Project Plan. Software quality	11	
	reliability, ISC	D 900 L, SQA Plan. SCM process. Version control.SCM standard.		
IV	Svstem engi	ineering: Hierarchy, Business Process & Product engineering:	13	
	Requirement	engineering, System modeling. Software prototyping. Design		
	Process. Design Software arch	gn Principles & Concepts. Design model & documentation. nitecture, Architectural styles. User-interface design: Golden Rule.		
	Software to	sting fundamentals: Test case decign. White hey testing Basis		
	path, control	structure-, Black box-Testing, &for specialized environments.		
	Strategic app	roach to S/W testing. Unit testing, integration testing, validation		
			12	
V.	Web Engine	ering: Attributes of web-based systems and applications.	12	
	WebApp Engi	neering Layers: Process, Methods, Tools and technology		

Web engineering process: Defining the framework, refining the framework.	
Reverse Engineering : Process, Reverse engineering to understand data,	1
processing & user Interfaces.	1
	L
Textbook :	l
1. Pressman Roger. S.: Software Engineering, A Practitioner's Approach TMH	
2. Somerville : Software Engineering (Addison-Wesley) (5/e)	l
3. Software Testing in Real World by Edward Kit	l
References :	
1 Eairly R : Software Engineering (McGraw Hill)	l
2 Davis A : Principles of Software Development (McGraw Hill)	1
3 Shooman M.L.: Software Engineering (McGraw-Hill)	1
4 Pankai Jalote - An Integrated approach to Software Engineering 3 rd	1
edition Narosa Publications	1
Course Outcomes:	
• Ability to compare and chose a process model for a software project development.	
Analyze and model a software system.	
Test a software system.	

Course	rse Code 17MSC202		
Course	rse Name Cloud Computing		
Course	Short Name	СС	
Total L	otal Lectures 60		
Total C	otal Credits 4		
Prereq	uisites :	<u> </u>	
• Kno	wledge of Operation	ating Systems and Database.	
Kno Course	owledge of Virtua Objective:	alization and Networking.	
• To s	study cloud com	puting concepts and models.	
• <u>To</u> s	study the techno	ologies required for Cloud Computing.	
• 10 s	study the applica	ations that uses cloud computing.	Total
Units		contents	Lectures
I	Basic Concep Characteristics Service Models infrastructure.	ts: Introduction cloud computing, History, Working, Benefits, 6, Application, and Deployment Models: public, private, hybrid, 2: SAAS, PAAS, IAAS, Cloud Computing Architecture, Cloud	11
II	Cloud Compu of parallel com Approaches to distributed cor Computing.	Iting Technologies: Parallel vs. distributed computing, Elements iputing: Hardware architectures for parallel processing, parallel programming, Laws of caution, and Elements of inputing: definition, component, Grid Computing, Utility	13
III	Virtualization Taxonomy of v and cons of vir	n: Introduction, Characteristics of virtualized environments, virtualization techniques, Virtualization and cloud computing, Pros rtualization, Technology example: VMware: full virtualization.	10
IV	Concurrent C parallelism for threads: introc Decomposition Cycle ,Program	Computing: Anatomy of the Aneka container, Introducing single-machine computation, Programming applications with duction Thread API's, Domain decomposition, Functional n, Multithreading with aneka: Model, Interface Compellability, life nming applications with aneka threads.	14
V	Storage in Cl centre(VDC) a desktop and a Cloud file sys and compariso	oud: Storage system architecture, Big data, Virtualized data rchitecture, VDC Environment, server, storage, networking, pplication virtualization techniques and benefits, stems: GFS and HDFS, BigTable, HBase and Dynamo. Features ons among GFS,HDFS.	12
	Text Books:		
	3. Rajkumar 4. Rajkumar	Buyya, "Mastering Cloud computing", McGraw Hill Buyya, "Cloud computing principles and paradigms", Wiley	
	3. Gautam Sl	hroff, Enterprise Cloud Computing, Cambridge	

- Dr. Kumar Saurabh, "Cloud Computing", Wiley Publication
 Greg Schulr, "Cloud and virtual data storage networking", CRC Press
 Barrie Sosinsky, "Cloud Computing", Wiley India

Course Outcomes:

- Ability to deal with cloud computing environment. ٠
- Understanding of modern computing technologies and storage technologies in distributed ٠ environment.

Course	se Code 17MSC203		
Course	ourse Name Design and Analysis of Algorithm		
Course	se Short Name DAA		
Total L	otal Lectures 60		
Total C	I Credits 4		
Prereq	requisites :		
• Basi	c knowledge of	Data Structure, Set theory.	
Course	e Objective:		
• To ii	ntroduce basic c	concepts of algorithms.	
• <u>To</u> ii	ntroduce mathe	matical aspects and analysis of algorithms.	
• 10 II • To ii	ntroduce algorit ntroduce various	hm design methods. s algorithmic techniques.	
Units		Contents	Total
			Lectures
I	Introduction: Algorithms, Analysis of Algorithms, Space and Time complexity of algorithms, Asymptotic Notations, Recurrences and their solution methods, Amortized analysis. 10		
II	Sorting networ	rks, comparison networks, biotonic sorting network, Advanced	11
	Data structure like Red Black Tree, Disjoint Set structure, Fibonacci Heap,		
	Divide and conquer basic strategy: binary search, quick sort, merge sort, Strassen's Matrix multiplication,		
III	I Advanced Design and Analysis Techniques: Greedy Algorithm: Minimum 14 spanning tree (Kruskal's and Prim's Algorithm), Single Source shortest 14 path(Dijkstra's Algorithm), Dynamic Programming: All Pairs shortest path 14 (Floyd Warshall Algorithm), Optimal Binary search tree, Travelling salesman 14		
IV	Tree traversal techniques : In order, Preorder, Post order, Breadth First13Search, Depth first Search, Backtracking : N-Queen Problem, Graph coloring, Hamiltonian cycle, Knapsack Problem13		13
V	NP-completeness: The classes P and NP, NP-complete problem, NP-Hard 12 Problem, Approximation algorithm: Vertex cover problem, travelling salesman 12 problem, set-covering problem. 12		12
	Text Books:		
	 Ellis Horowitz, Sartaj Sahani, Sanguthevar Rajasekaran "Fundamentals of Computer Algorithms" Second Edition Universities Press Chandra Mohan "Design and Analysis of Algorithms" Second Edition PHI 		
	 Gilles Brassard, Paul Bratley "Fundamentals of Algorithms" PHI. Sara Baase, Allen Van Gelder "Computer Algorithms Introduction to design and Analysis", Pearson. Donald E. Knuth "Eundamentals Algorithms" Third edition 		
Course	Outcomes:		

٠

- •
- Designing of algorithms using different strategies. Ability to analyze the algorithms. Knowledge of optimization of solutions of a problem.

Cours	e Code	17MSC204		
Cours	e Name	Advanced Web Technology		
Cours	e Short	AWT		
Name				
Total	Lectures	60		
Total	I Credits 4			
Prere	quisites :			
• Kn	owledge of HTN	۹L.		
Fu	ndamentals of o	designing & hosting the websites.		
Cours	e objective:			
 We To 	b Site Designin	ig and Development using Open Source Technologies.		
• To	learn the creati	ion of dynamic websites using Open source databases.		
Units		Contents	Total	
			Lectures	
Ι	Web basics,	Multitier Application Architecture, Client-Side Scripting versus	12	
	Server-Side Scripting, World Wide Web Consortium (W3C). HTML5 : Features, Editing HTML5 structure Headings Linking Images Lists Tables Forms			
	HTML5 New	r Elements: Form input type element : colors, date, time, e-mail		
	addresses, n	umbers, range, search, telephone numbers, URLs, Data list		
	Elements. P	Page-Structure Elements : header, nav, figure, fig caption, article,		
	summary, details, section, aside, meter, footer. Audio & Video elements.			
II	CSS: Introdu	action, basic properties: text, list, border font, Selectors:	12	
	universal, typ	pe, id, class. CSS types : Inline, Internal and External Style Sheets.		
	Introductio	n: PHP and open source. Overview of PHP: Features, PHP HTML		
	embedding ta	ags and syntax, simple script examples, PHP variables, operators,		
	data types.			
III	Control Stat	tement in PHP: If Else, Switch Statements. Looping Statements	12	
	For, While, D	o-While, Break statements. PHP Array: Array Types: Indexed		
	to functions,	declaring functions, function scope, passing arguments to function,		
	using include	e files and require statements, mail functions.		
IV	Object orier	nted concepts: Introduction, basic class definition, visibility, and destructors, static keywords, class constants, inheritance, File	12	
	handling in	PHP : Open, Append, Write, Read, Delete. PHP: String and String		
	functions, PHP Maths Functions.			
V	Burne 1		12	
		OF HIML and PHP: Adding PHP to HIML or processing HIML form		
	Downloads Fi	ile, Exception and Error handling.		
	Datati			
	selecting a d	perations: Operations with PHP, connecting to Mysql with PHP, atabase, building and sending query SELECT_INSERT_DELETE		
		account of the sending query, select, insert, beleft,		

	UPDATE.	
	PHP Mysql functions : mysqli_affected_rows(), mysqli connect(), mysqli close(), mysqli_query(), mysqli_select_db(), mysqli_num_rows(), mysqli_num_fields(),	
	Text Books :	
	 Paul Deitel, Harvey Deitel and Abbey Deitel, "Internet & World Wide Web: How to program", Fifth Edition Pearson ISBN 978-0-13-215100-9 Thomas A. Powell, "HTML & CSS: The Complete Reference", Fifth Edition, 	
	McGraw-Hill, ISBN: 978-0-07-174170-5 3 Kogent Learning Solutions Inc. HTML5 Black Book: Covers CSS3 Javascrint	
	XML, XHTML, Ajax, PHP and Jquery, Dreamtech Press, New Delhi, 2011	
	 Michael K. Glass, Yann Le Scouarnec, Elizabeth Naramore, Gary Mailer, Jeremy Stolz, Jason Gerner, Beginning PHP, Apache,MySQL Web development, Wrox Publication. 	
	 Jason Gerner, Elizabeth Naramore, Morgan L. owens, Matt warden, Professional LAMP: Linux, apache, MySqland PHP5 Web development, Wrox Publication 	
	References :	
	 Lynn Beighley, Michael Morrison, Head first PHP and Mysql, Second Edition, Oreilly publication. Luke Weling, Laura Thomas, PHP and MYSQL Web Development, Pearson Education. Tim Converse, Joyce Park, PHP5 and Mysql Bible, Wiley publication 	
	For More reading:	
	1. www.w3schools.com	
	2. www.devguru.com	
	3. www.javatpoint.com	
	4. <u>www.tutorialspoint.com</u>	
Course	2 Outcomes:	
• Abil	ity to configure text, color, and page layout with Cascading Style Sheets.	
Able	e to use of images & multimedia on web pages.	
l∎ Skil	l of developing the server and client side programs	

Skill of developing the server and client side programs.
 Skill & knowledge of Web page design using HTML5 and PHP.

Course	e Code	17MSC205		
Course	e Name Data Mining			
Course	e Short	DM		
Name				
Total L	.ectures	60		
Total C	otal Credits 4			
Prereq	juisites:			
Bas	sics knowledg	e of Data and its preprocessing. f database management systems.		
Course	e Objectives			
• To	learn the Dat	a Visualization and pattern identification.		
ToStu	study the Cla udy of advanc	issification, Clustering, and Association analysis. ed data mining techniques.		
Units		Contents	Total Lecture	
			S	
I	Introduction: Data Mining Concept,KDD Process ,Architecture of Data mining12system, Data Mining Functionalities, Classification of data mining system, Data mining Task primitives, Integration of Data mining with Database or Data Warehouse, Major Issues in Data mining.12Data Preprocessing: Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.12			
II	Mining Frequent Patterns, Associations and Correlations: Basic concepts 12 and Road Map, Efficient and Scalable Frequent Itemset Mining Methods, Mining 12 Various Kinds of Association Rules, From Association Mining to Correlation 12 Analysis, Constraint-Based Association Mining. 12			
III	Classification and Prediction: Introduction, Issues, Comparison, Classification by Decision Tree Induction, Bayesian Classification, Rule- Based Classification, Classification by Backpropagation.12Prediction: Linear Regression, Nonlinear Regression, Accuracy and Error Measure, Evaluating the Accuracy of Classifier or Predictor.12		12	
IV	Cluster Analysis: Introduction, Application, Requirement of Clustering, Data 12 type in Cluster Analysis, Categorization of major Clustering methods. 12 Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Base 12 Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, 12 Constraint – Based Cluster Analysis. 12		12	
V	Graph Mining, Social Network Analysis and Multi-relational Data Mining, Mining Object, Spatial, Multimedia, Text and Web Data, Applications and Trends in Data Mining		12	

Text Books:		
1. J.Han, M.Kamber-Data Mining: Concepts and Techniques, 2 nd Edition Morgan Kaufmann Publisher.	,	
2. Bharat Bhushan Agarwal ,Sumit Prakash Tayal-Data Mining and Data Warehousing, , Universities Sciences Press		
3. Arun K.Pujari-Data Mining Techniques, 2 nd Edition, Universities Press.		
References:		
 David Hand, Heikki Manila, Padhraic Symth "Principles of Data Mining "PHI Publication. Margaret H. Dunham- Data Mining: Introductory and Advanced Topics Pearson Education. PANG-NING TAN, Vipin Kumar, Michael Steinbach "Introduction to Data Mining" 		
4. Charle C. Agarwai, Data Minning Textbook, Springer Publication.		
Able to perform Data Preprocessing.		
Ability to perform Descriptive and predictive analysis of data.		

Course Code	17MSC206
Course Name	Computer Lab 1(Based on 17MSC202 and 17MSC203)
Course Short Name	CL 1
Total Teaching Hours	45
Total Credits	3

Practical list will be freshly prepared by subject teacher in every session. So the list is not mentioned.

Course Code	17MSC207
Course Name	Computer Lab 2 (Based on 17MSC204 and 17MSC205)
Course Short Name	CL 2
Total Teaching Hours	45
Total Credits	3
Practical list will be freshly prepa not mentioned.	ared by subject teacher in every session. So the list is

Course Code	17MSC208
Course Name	Computer Lab 3 (Based on Software Testing)
Course Short Name	CL 1
Total Teaching Hours	90
Total Credits	6

Practical list will be freshly prepared by subject teacher in every session. So the list is not mentioned.

Course Code	17MSC209	
Course Name	Seminar	
Course Short Name	SEM	
Total Teaching Hours	30	
Total Credits	2	
Prerequisites		
-		
Course Objectives		
• To learn new topics by self learning.		
 To study and review the research papers, ma 	gazines, etc.	
 To develop communication, interpersonal and Synopsis format: 		
1. Abstract		
2. Introduction		
3. Technology focus		
4. Future scope		
5. Conclusion		
6. References		
Seminal Report Format.		
1. Abstract		
2. Introduction		
3. Technology Focus		
4. Applications		
5. Future Scope		
6. Conclusion		
7. References		
Rules:		
 Topic should be based on recent tech Topic should be research oriented. The topic may be out of the scope of 	nology. syllabus.	
4. Synopsis should submit the synopsis department.	in the given format for approval by the	
topic in brief.	have be a substantial for some the summery of whole	
6. Minimum 10-12 slides presentation sl	nould be prepared for seminar.	
 Seminar report should be duly signed 8 It will be responsibility of duide and s 	tudents to communicate about	
selection/rejection/preparation of the	topic to each other.	
 Synopsis should be submitted within 10. Synopsis should be hand written. 	tipe span specified by Seminar In-charge.	

10. Synopsis should be hand written.

Formatting Rules:

- a. Paper size A4.
- b. Margins all side 1 inch.
- c. Line Spacing for final report 1.5
- d. Font : Times New Roman
- e. Size:
 - i. 12 for Normal body of text in the seminar report
 - ii. 14 for title and headings in the seminar report
 - iii. 9 for footnote and style italic

Course Outcome:

- Ability to learn a new technology and formulate the contents for self learning.
- Able to present the new topic and defend the questions raised.
- Gain self confidence and stage daring.

Second Year M. Sc. (Computer Science) Semester-IV

Course	e Code	17MSC210	
Course Name		Elective 1 (CYBER SECURITY AND ETHICAL HACKING)	
Course	e Short	ELE1	
Name			
Total	Lectures	60	
Total	Cradita	4	
Total	creats	4	
Prerec	uisites :		
• Ba	sics information	of Viruses and Firewall.	
• Bas	sic knowledge o	f Networking Protocols.	
Course	e Objectives:	importance of information cocurity	
• To	understand var	ious hacking techniques and attacks.	
Units		Contents	Total
			Lectures
I	Security Intr	oduction: What is cyber Security?, Security Services , Security	12
	attacks, Cyber	Security Model, Encryption Techniques, Public Key	
	Cryptography,	RSA	
II	Cyber Securi	ty: System Security – Intruders, Viruses, Threats , Firewalls,	12
	Web Security,	IP Security, Email Security, PGP, Secure Socket Layer,	
	Transport Laye	er Security, Digital Signature.	
III	Introduction	to Hacking: Introduction to Hacking Phases of an Attack –	12
	Types of Hack	er Attacks Session Hijacking, Web Server Attacks, Database	
	Attacks, Passw	vord Cracking, Network Devices & Attacks, Wireless Network	
	Attacks, Troja	ns , Buffer Overflows, Denial of Service Attacks, Social	
		lacks, mysical relief ation Atlacks.	
IV	Session Hijad	cking: Introduction: Spoofing vs Hijacking, Steps in session	12
	hijacking, Seq	uence number prediction, Session Hijacking Tools.	
	Hacking Web	Servers : Introduction, Sources of Security vulnerabilities in	
	Web Server, A	ttacks against Internet Information Services ,	
V	Web Applicat	tion Vulnerabilities: Web Application Threats, Tools, SOL	12
	injection, SQ	L Injection Techniques, Preventing SQL Injection Attacks, Tools.	
	Toxt Books		
	I CAL DOURS:		
	1. Cryptograph Willam Stalling	ny and Networking Security Principles & Practice (fourth edition) gs	
	2. The fundam	entals of New Security - John F. Chavwan, Artch. House	
	3. Ec-Council, Cengage Learr	"Ethical Hacking and Countermeasures: Attack Phases", Delmar hing, 2009.	

4.Naina Godbole, Sunil Belapure, "Cyber Security-Understanding Cyber crime	·,	
Computer forensic and legal perspective" Wiley India Pyt 1td		
Computer forensic and legal perspective, whey india PVt. Etd.		
References :		
1. Michael I. Simpson, Kent Backman, James E. Corley, "Hands-On Ethic	cal	
Hacking and Network Defense", Cengage Learning, 2012.		
2. Ankit Fadia "Ethical Hacking" second edition Macmillan India Ltd. 2006		
course outcomes.		
• Understanding of system security and cyber security.		
Knowledge of different attacks.		
• Use of different tools for backing, bijacking and web vulnerability		

Course Code	17MSC210
Course Name	Elective 1(Computer Oriented Optimization Techniques)

Course	e Short Name	ELE1	
Total I	Lectures	60	
Total (Credits	4	
Prerec	uisites :		
• Kn	owledge and app	plications of Numerical methods, Statistical method.	
Course	e Objectives:		
• To • To	study the conce Learn Critical Pa	pt of Project Management. ath Approach.	
• To	Learn System Ir	ntegration, Cost Benefit Analysis and improve productivity.	-
Units		Contents	Total
			Lectures
I	Introduction	of Operation Research (OR): Definition, Advantages of OR.	11
	Classification M For Solving OR	Aodel of OR, Applications and Limitations Of OR, General Methods Model.	
	LPP: Introduct	tion, Characteristics, Mathematical Formulation, Graphical	
	Solution Metho	od, Limitation Of Graphical Method, Artificial Variable, Slack	
	variable, Surpi	us variable, Simplex Method. Duality in Linear Programming.	
II	Transportatio	on Model: Definition, Formulation, Balance And Unbalance	10
	Problem: North	n West Corner Method, Least Cost Method, Vogel's Approximation	
	Method Row M		
	Assignment N	Model: Definition, Formulation, Hungarian Method.	
III	Decision The	ory: Definition, Decision Making Environment Certainty,	14
	Uncertainty: M	laximax Criterion, Laplace Criterion, Hurwicz Alpha Criterion,	
	Theory, Decisio	on Trees.	
	Game Theory	• Terminology, Two-Person Zero-Sum Game, Pure Strategies	
	(Minimax And	Maximin Criterion), Game With Saddle Points, Mixed Strategies,	
	Rules Of Domin	nance, Graphical Method.	
IV	Sequencina P	Problem: Notation Terminology, Processing N Jobs Through Two	13
	M/C, Three M/G	C, Two Jobs Through Three M/C, N Jobs Through M M/C.,	-
	Salesman Prob	olem.	
	Queuing Theo	ory: Introduction, Basic Structure, Component, Queuing Costs,	
	The Manageria	Problems. Simulation: Introduction, Steps Of Simulation	
	Process, Advar	ntages N Limitation, Application Of Simulation To Queuing Theory.	
V	PERT & CPM:	Introduction, Difference Between PERT and CPM, Application,	12
	Basics Steps, N	Network Diagram Representation, Rules for Drawing a network,	
	CPM: Terminol	ogy, Backward Pass. PERT Estimation, Advantage and limitation	
		MMI.	
	Text Books:		
	1. "Operation	Research " by Hira and Gupta	
	2. "Operation	Research " by Anand Sharma Taha Publication	

	References :	
	1. "Operation Research " by Shridhar Bhat	
	2. "Operation Research " by Natrajan Taha Publication	
Co	urse Outcomes:	
•	Knowledge of various techniques of operations research	
•	Ability to solve real life problems using methods of Operation Research.	
•	Knowledge of selecting an optimum solution with profit maximization.	

Course	e Code	17MSC210	
Course Name		Elective-1: Soft Computing	
Course Short Name		Ele1	
Total I	Lectures	60	
Total C	Credits	04	
Prerec	uisites :	near Alashra and Calculus, Drabability theony	
Course	e Objective:		
 To To To 	solve complex re recognize the fea design, analyze	eal-world problems using soft computing techniques. asibility of applying a soft computing methodology for a particular pl and perform experiments using soft computing techniques.	roblem.
Units		Contents	Total Lectures
I	Soft Computi	ng: Introduction, Hard Computing and Soft Computing,	10
	Constituents of Neural network Introduction to	Soft Computing: Conventional AI to Computational Intelligence, s, Fuzzy set theory, Evolutionary Computation. Hybrid systems, Neuro-Fuzzy and soft computing characteristics.	
			12
II	Neural Netwo Concept, Basic separability, He	brk : Introduction, Advantages, Applications, Fundamental model of artificial neural network, McCulloch-Pitts Neuron, Linear abb Network.	12
III	Supervised Le Networks, Adap Back propogati	earning Networks: Introduction, Architectures of: Percepteron obtive Linear Neuron (Adaline), Multiple Adaptive Linear Neurons, on Network.	14
	Unsupervised weight competiorganizing feat networks (Full	Learning Networks: Introduction, Architectures of: Fixed itive nets (Maxnet, Mexican Hat, Hamming), Kohonen self- ure maps, Learning Vector Quantization, Counter propagation & Forward only).	
IV	Fuzzy Logic: I Fuzzy measure Truth values & Decomposition decision makin	Introduction, Fuzzy sets, Fuzzy relations, Fuzzy arithmetic and s, Fuzzy Rule base and approximate reasoning: Introduction, Tables in Fuzzy logic, Fuzzy propositions, Formation of rules, of Rules, Aggregation of Fuzzy Rules, Fuzzy Reasoning. Fuzzy g.	12
V	Genetic Algor Techniques, GA Traditional met Algorithm: Enc genetic algorith	ithm: Introduction, Traditional Optimization and Search A and search space, Difference of Genetic Algorithm and hods, Simple genetic algorithm, General GA, Operators in Genetic oding, Selection, Crossover and Mutation. Problem solving using hm, Advantages & Limitations of GA, Applications of GA.	12
	Text Book : 1. Dr. S. N. S Edition, Wil 2. Samir Roy, and Genetic	Sivanandam, Dr. S. N. Deepa, "Principles of Soft Computing", 2 nd ey India Pvt. Ltd. Udit Chakraborty, "Introduction to soft computing Neuro-Fuzzy c Algorithms", Pearson.	

3	 S. R. Jang, T. Sun, E. Mizutani, "Neuro-Fuzzy and Soft Computing A Computational Approach to Learning and Machine Intelligence", PHI Learning Private Ltd. 	
F	Reference Books:	
1	. Satish Kumar, "Neural Networks A Classroom Approach", Tata McGraw-Hill Education Pvt. Ltd.	
2	 Simon Haykin, "Neural Networks and Learning Machines", Third Edition, PHI Learning Private Ltd. 	
3	 M. Ganesh, "Introduction to Fuzzy Sets and Fuzzy Logic", PHI Learning Private Ltd. 	
4	. John Yen, Reza Langari, "Fuzzy Logic Intelligence, Control and Information", Pearson Education.	
5	5. David E. Goldberg, "Genetic Algorithms in Search, Optimization & Machine Learning", Pearson Education.	
Course	Dutcomes:	
Abilit	y to solve complex real-world problems using soft computing techniques.	

- Conceptualize fuzzy logic & its implementation for various real world applications. ٠
- Derive the mathematical background to carry out optimization using genetic algorithms.

Course	e Code	17MSC210	
Course Name		INTERNET OF THINGS	
Course Short		IOT	
Name			
Total I	Lectures	60	
Total	Credits	4	
Prerec	quisites :		
• Kn	owledge of inter	rnet, sensors and sensor network.	
Course	e Objectives:	Technology, Soncer Technology and Satellite Technology	
• To	study the resou	irce management and security issues in Internet of Things.	
• To	study the applic	cation areas of Internet of things.	-
Units		Contents	Total
			Lectures
Ι	MOBILE COM	IPUTING AND SENSOR: Adhoc Network and Mobile	12
	Information ex	xchange, Mobile Application of Smart computing and self	
	monitoring le	chnologies, Radio Frequency Identification Technology for	
	networking an	d collaborative communication.	
	IOT INTROD	UCTION: What is the Internet of Things? : History of IoT. About	
	IoT, Overview	and Motivations, Examples of Applications, Internet of Things	
	Definitions and	d Frameworks : IoT Definitions, IoT Architecture, General	
	Observations,		
II	FUNDAMENT	AL IOT MECHANISMS AND KEY TECHNOLOGIES:	12
	Identification of	of IoT Objects and Services, Structural Aspects of the IoT,	
	Environment C	Characteristics, Traffic Characteristics, Scalability,	
	Interoperabilit	y, Security and Privacy, Open Architecture, Key 101	
	Support, Devic	ce Power, Sensor Technology, RFID Technology, Satellite	
	Technology		
III	EVOLVING IO	DT STANDARDS : Overview and Approaches, MOTT Protocol.	12
	Representation	nal State Transfer (REST), ETSI M2M, IP in Smart Objects	
	(IPSO)		
	Signal Condit	tioning Units: Sensors(Temperature Sensor, Pressure Sensor,	
	Motion Contro	I Sensor, Soil Moisture Sensor, Ultrasonic Range Sensor),	
	Gateway (Kas	pperry P1, Arduino, Its Difference), Actuators	
IV	WIRELESS T	ECHNOLOGIES FOR THE IoT: WPAN Technologies for	12
	IOT/M2M: Zi	gbee/IEEE 802.15.4, Radio Frequency for Consumer Electronics	
	Technology.	Cellular and Mobile Network Technologies for	
	IoT/M2M:Ove	erview and Motivations, Universal Mobile Telecommunications	
V	System, LIE	F THINGS PRIVACY, SECURITY AND GOVERNANCE	12
	Vulnerabilities	of IoT, Security requirements, Threat analysis, Use cases and	**
	misuse cases,	IoT security tomography and layered attacker model, Identity	

	establishment, Access control, Message integrity, Non-repudiation and availability, Security model for IoT.	
	Text Books:	
	 Daniel Minoli, "Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications", Willy Publications Bernd Scholz-Reiter, Florian Michahelles, "Architecting the Internet of Things", 	
	References :	
	1. Hakima Chaouchi, " The Internet of Things Connecting Objects to the Web" Willy Publications	
	2. Olivier Hersent, David Boswarthick, Omar Elloumi, The Internet of Things: Key Applications and Protocols, 2nd Edition, Willy Publications	
	3. Daniel Kellmereit, Daniel Obodovski, "The Silent Intelligence: The Internet of Things",. Publisher: Lightning Source Inc; 1 st edition (15 April 2014).	
Course	e Outcomes:	
• Un • Kn	derstanding of Internet of Things. owledge of Key technologies and standards used in IoT. curity and governance in IoT.	

Course Code		17MSC211					
Course Name		Image processing					
Course	Short Name	IP					
Total L	ectures	60					
Total C	credits	04					
Prereq	uisites :						
• Bas	ic knowledge in	Computer Graphics.					
Kno	wledge of digita	Il Image and related terms.					
	• Objectives:						
• To :	study the image	enhancement techniques.					
• To s	study image res	toration procedures.					
• To :	study the image	compression procedures.					
• To s	study the image I	segmentation and representation techniques.	Total				
Units		contents	Lectures				
I	Image funda	mentals :Introduction, application, fundamental steps,					
	component, Dimensions of Image, Different Dimensions of Image signal,						
	between pixels: Neighbor of pixel. Connectivity						
II	Image transf	formation and Enhancement: Introduction to Fourier					
	transform, discrete Fourier transform, Walsh transformation, Hadamard						
frequency methods. Spatial fil		hods, Spatial filtering: Smooth & Sharpening, low pass and	15				
high pass.							
111	Image Resto	ration: Introduction, Degradation model, algebraic approach					
	to restoration,	onconstrained restoration, constrained restoration	13				
	Segmentatio	n : Introduction to image segmentation: point, line edge	15				
	detection, Three	esholding, Regions Based segmentation, Edge linking and					
	boundary dete	ction					
IV	Compression	: fundamentals, Image compress models, Huffman coding, run					
	length coding,	lossless predictive coding, Lossy predictive coding,					
compression standard: JPEG Color Model: RGB,CMY,HIS, Colors Code,			13				
	Grayscale to R	GB conversion					
V	Representati	on and description - Representation, Boundary descriptors,					
	Regional descr	iptors, Relational descriptors Object recognition: Patterns					
	and pattern cla	asses, Recognition based on decision ,theoretic methods,	11				
	structural met	nous					
	Text Books :						
	1 Rafael C	Gonzalez "Digital Image Processing" Addison Wesley					

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			Public	ation	0-201-	4357	72									
		2. B. Chanda& D. DuttaMajumder, "Digital image processing & analysis" 2 nd														
		Edition Eastezn Economy Edition, PHI 2011-978-81-203-43252														
	3. Anil k. Jain "Fundamental of Digital Image Processing" Eastern Economy						nomy									
	Edition, PHI-2010-978-81-203-0929-6															
References :																
	1. S. Sridhar "Digital Image Processing" Oxford University press, 2011.															
	2. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Image Processing, Analysis															
	and Machine vision", CL Engineering Publication.															
Co	urse	Ou	tcomes	:												
	Kno	wloc	tao of	tho	Imago	onh	ancomo	nt	tochniqu	100	Imago	roctor	ation	nroco	duroc	and
	• Knowledge of the image emirancement techniques, image restoration procedures at							anu								
	compression procedures.															
1	17															

• Knowledge of image segmentation and compression techniques.

Course Code		17MSC212					
Course Name		Modeling & Simulation					
Course Short Name		MS					
Total L	.ectures	50					
Total C	Credits	04					
Prereq	uisite:						
• Kno	wledge of Calculu	is, Linear Algebra, Differential Equations, Basic Probability and Sta	itistics.				
• To	learn simulation p	rinciples and simulation software in brief.					
 To s To s 	study the construc learn methods for	ction of difference-based computer models. reviewing models, their verification and validation.					
Units		Contents	Total Lectures				
I	Introduction to Simulation, Simulation Examples, Simulation Principles and Simulation Software: Introduction, Advantages and Disadvantages of Simulation, Areas of Application, System and System Environment, Components of a System, Model of a Systems, Types of Models, Steps in Simulation Study, Simulation of Queuing systems, Simulation of Inventory systems, General Principles, Concepts of Discrete event Simulation, List processing, History of Simulation Software, Selection and Examples of Simulation, Various Simulation packages, Experimentation and Statistical Analysis Tools.						
II	Statistical and Queueing Models in Simulation: Statistical Models in Simulation, Review of Terminology and concepts, Useful Statistical Models, Discrete Distributions, Continuous Distributions, Poisson Process, Empirical Distributions, Queueing Models, Characteristics of Queueing Systems, Queueing Notations, Long Run Measures of Performance of Queueing System, Steady State Behavior of Infinite Population Markovian Models, Steady State Behavior of Finite Population Models.12						
III	Random Number and Random Variate Generation: Properties of Random Numbers, Generation of Pseudo Numbers, Techniques for Generating Random Numbers, Tests for Random Numbers, Random Variate Generation, Inverse Transform Technique, Acceptance- Rejection Techniques, Input Modeling, Data Collection, Identifying the Distribution with Data, Goodness-of-Fit Test, Selecting Input Models without Data, Multivariate and Time Series Input Models.11						
IV	Verification, Calibration and Validation of Simulation Models: Model Building, Verification and Validation, Verification of Simulation Models, Calibration and Validation of Models, Estimation of Absolute Performance, Types of Simulation with respect to Output Analysis, Stochastic nature of Output Data, Measure of Performance and their Simulations, Output Analysis for Terminating Simulations, Output Analysis for Steady State Simulation.						
V	Estimation of F Comparison of S Simulation, Man Performance Me	Relative Performance: Comparison of Two system design, Several system design, Meta modeling , Optimization via ufacturing and Material Handling Simulations, Goals and asures, Issues in Manufacturing and Material Handling	11				

Si	Simulations, Case Study of Manufacturing and Material Handling Systems.					
Τe	Text Books:					
1.	"Discrete Event System Simulation" 5 th Edition- Jerry Banks, John S. Carson, Barry L. Nelson & David M. Nicol (PHI).					
2.	2. "Simulation Modeling and Analysis"- Averill Law, W. David Kelton (McGrawHill)					
3.	"System Simulation"- Geffery Gordon (PHI)					
R	References:					
1.	"System Analysis and Modelling" – Donald W. Body (Academic Press Harcourt, India). "Simulation with Arena"- W. David Kelton, Randall Sadowski & Deborah					
Sadowski (McGrawHill)						
Course Outcomes :						
Ability	Ability to derive the mathematical model of the system.					

Knowledge of different system modeling.

Course Code	17MSC213
Course Name	Computer Lab 1(Based on 17MSC210)
Course Short Name	CL 1
Total Teaching Hours	90
Total Credits	6

Practical list will be freshly prepared by subject teacher in every session. So the list is not mentioned.

Course Code	17MSC214
Course Name	Computer Lab 2(Based on 17MSC211)
Course Short Name	CL 2
Total Teaching Hours	90
Total Credits	6

Practical list will be freshly prepared by subject teacher in every session. So the list is not mentioned.

Course Code	17MSC215			
Course Name	Project/ Dissertation			
Course Short Name	Proj			
Total Teaching Hours	120			
Total Credits	8			
Prerequisites				
 Preliminary knowledge of research methodology. Knowledge about technology and application domain in which project will be developed. Good knowledge of subject domain and Software Engineering. 				

Objectives

- To give the students hands on experience of real life system development life cycle involving deadlines and team work.
- To make the students apply the technologies learnt during the programme.
- To provide the experience in analyzing, designing, implementation and evaluating information systems by following proper documentation process.
- To learn research methodology & tools used in research.

Rules for Project Work :

A student will be examined in the course "Project Work" as given below:

- 1. Project work may be done individually or in groups. However if project is done in groups, each student must be given a responsibility for a distinct task and care should be taken to see the progress of individual.
- 2. Students should take guidance from a guide and prepare a Project Report on "Project Work" in 2 copies to be submitted to the Head of the Department. A soft copy of project report along with source-code and data should also be submitted.
- 3. The Project Synopsis should contain an Introduction to Project, which should clearly explain the project scope in detail. Also, Data Dictionary, DFDs, ERDs, File designs, experimental setup and methodology.
- 4. The project report will be duly accessed by the guide of the project and marks will be communicated by the Head of the Department to the Examination Department.
- 5. The project report should be prepared in a format prescribed by the College, which also specifies the contents and methods of presentation.

General Instruction Regarding Preparation of Project Report :

TYPING:

- (a) The typing shall be standard 12 pts in double spacing using only
- (b) Margins must be Left 1.5 inches Right 1 inches Top 1 inches Bottom 1 inches
- (c) Paper A4 size Paper

COPIES:

Two hard-bind copies (As per format displayed herewith) One original and one clean Xerox Copy.

FORMAT FOR TITLE PAGE AND FOR COVER PAGE :

PROJECT REPORT

ON

NAME OF THE PROJECT

ΒY

NAME OF STUDENT

GUIDED BY

NAME OF THE GUIDE

P.G. Department of Computer Science & Technology

Degree College of Physical Eucation

Shree H. V. P. Mandal, Amravati.						
ACADEMIC SESSION						
Report format for Application Development	Report format for Research Projects:					
Projects:	1 Blank Page at beginning					
1 Blank Page at beginning						
Title Page	Title Page					
Certificate from Guide	Certificate from Guide					
Acknowledgement	Acknowledgement Index with printed Page Numbers					
Index with printed Page Numbers						
	CHAPTER 1 : INTRODUCTION 1.1 Problem Domain					
1 1 Company Profile (ontional)						
1.2 Existing System and Need for System	 Problem Statement Experimental Setup 					
1.3 Proposed System						
1.4 Scope of Work						
1.5 Operating Environment Hardware and	CHAPTER 2 : PROBLEM DEFINITION 2.1 Review of Related Work 2.2 Problem Definition					
Software						
CHAPTER 3 : ANALYSIS & DESIGN	CHAPTER 3 : EXPERIMENT DESIGN & METHODOLOGY					
3.1 User Requirements						
3.2 Software Requirements	3.2 Methodology					
3.3 System Flow	CHAPTER 4· RESULT ΔΝΔΙΥSIS					
3.4 Module Flow	a Data Sheets					
3.5 Module Document	b. Graphs & Tables					
3.6 Input Document						
3.7 Computational Method Document (If	CHAPTER 5: CONCLUSION AND FUTURE SCOPE					
methods are used)	5.1 Issues and Limitations					
3.8 Output Document	5.2 Conclusion					
3.9 Data Flow Diagram (DFD)	5.3 Future Scope					

3.10 Functional Decomposition Diagram (FDD)	
3.11 Entity Relationship Diagram (ERD)	REFERENCES
3.12 Data Dictionary	
3.13 Table Design	1 Blank Page at the end.
3.14 Menu Tree	
3.15 Menu Screens	
3.16 Input Screens	
3.17 Report Formats	
3.18 Pseudocodes (optional)	
3.19 Test Procedures (optional)	
CHAPTER 4: IMPLEMENTATION & RESULTS	
4.1 Input Forms with Data	
4.2 Output Reports with Data	
4.3 Sample Code	
CHAPTER 5 : USER MANUAL	
5.1 User Manual	
5.2 Operations Manual / Menu Explanation	
5.3 Forms and Report Specifications	
CHAPTER 6: CONCLUSION AND FUTURE SCOPE	
6.1 Drawbacks and Limitations	
6.2 Conclusion	
6.3 Proposed Enhancements	
REFERENCES	
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	1

Course Outcomes

- Learn proper project documentation.
- Ability to implement the commercial or research project.
- Ability to commissioning of the developed software.
- Presentation and marketing skills for the developed application.