Progressive Education Society's

Modern College Of Engineering, Pune 05.

1186A, Shivaji Nagar, Pune- 411 005.

DEPARTMENT OF INFORMATION TECHNOLOGY

E- Curriculum Booklet

YEAR: 2020-21 **SEMESTER: I**

CLASS: BE **DIV: A & B**

Vision Statement:

VISION AND MISSION OF THE INSTITUTE

Vision Statement:

To create a collaborative academic environment to foster professional excellence and ethical values

Mission Statement:

1. To develop outstanding professionals with high ethical standards capable of creating and managing global enterprises
2. To foster innovation and research by providing a stimulating learning environment
3. To ensure equitable development of students of all ability levels and backgrounds
4. To be responsive to changes in technology, socio-economic and environmental conditions
5. To foster and maintain mutually beneficial partnerships with alumni and industry

VISION AND MISSION OF THE DEPARTMENT

Vision Statement:

To develop proficient IT engineers for the Industry and Society.

Mission Statement:

1. To achieve academic excellence.
2. To develop students for being competent in dynamic IT environment.
3. To encourage research and innovation.
4. To inculcate moral and professional ethics.

PEO's OF THE DEPARTMENT

1. Demonstrate sustained learning by building the profound foundation of math's, science and engineering principles and make the students erudite self-reliant and adaptable to diverse culture of multidisciplinary environment.
2. Prepare graduate with strong knowledge and skills in the field of Information Technology to develop solutions of complex engineering problems.
3. To bring leadership skill with teamwork in continuous learning environment to bear with professional challenges.
4. To inculcate ethics towards issues of professional and social relevance.

PSO's OF THE DEPARTMENT

1. Graduate exhibits skills to analyze, design and develop software.
2. Graduate demonstrate technical competency and leadership qualities to work in multidisciplinary environment.

PROGRAM OUTCOMES

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

2. Problem analysis: Identify, formulate, research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

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

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

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

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

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

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

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

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

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

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

LONG TERM GOALS

1. To Improve Industry Collaboration.
2. Promote Faculty for Research.
3. To Introduce Post Graduates Programme and Research Center.
4. To Enhance Infrastructure and lab development.

SHORT TERM GOALS

1. To enhance teaching learning process with effective utilization of e-resources
   - Moodle
   - Activity Based Teaching.
   - Online Courses. (NPTEL/Spoken Tutorials)
2. To organize national level conference / workshop.
3. Focused Interaction with Alumni.
   - Forum for Career Guidance
   - Guidelines for Training and Placements
   - Expert /Webinar/Seminar
   - Suggestions on Programme Improvisation.

INDEX

STUDENT ACADEMIC PLANNER

Activity	Period/Frequency
HOD Meeting with faculty	Prior to term commencement
Student's registration and its reporting	First week of commencement
Attendance review	Monthly (Thrice a term)
Remedial actions to be taken for low attendance category students and its followup	Monthly (Thrice a term)
Syllabus review	Monthly
Peer Feedback	Once a term
Mentor mentee meeting	Monthly (Thrice a term / need based during pandemic)
Assessment of Curriculum (Theory + Practical)	At the discretion of department
Midterm verification of Lab work	Once a term
Parents meet	Once a term
TE Seminar reviews as per SPPU norms	As per the need of course
BE Project reviews as per SPPU norms	As per the need of course
Feedback by students about Faculty	Twice a term
Feedback by students about Course (Course Exit)	End of term
Feedback by students about Program Exit (Graduate Exit)	End of term
Student Satisfaction Survey by students	End of term
Mock oral practical exams and final submission	End of term
Submission of Term Closure Report	End of term
Completion of Student Profile Booklet	End of term

STUDENT CO CURRICULER ACTIVITY PLANNER

Sr No.	Date	Name of activity	Duration	Mapping with PO's	Guest speaker	Beneficiaries	Faculty Incharge
ITSA: Poonam Rakibe							
1	23/6/2020	International Yoga Day	1Hr	PO 6	Mrs.Rani Sharma	SE/TE/BE and Staff	Mrs.Swapna Bhavsar
2	24/06/2020	SE Orientation Program	1 Hr	PO 6,8	Mrs. S.D.Deshpande PES's MCOE,IT	SE	Ms.Poonam Rakibe
3	25/07/2020	Agile Development in Software Industry	2 Hr	PO 3, 9, 12	Mr. Nilesh Naik	TE	Ms. Deepali Bhanage Naik
4	5/9/2020	Project Management	4 Hr	PO 3, 9, 11,12	Mr. Nilesh Naik & Mr. Manish Anandani	TE	Ms. Deepali Bhanage Naik
5	10/10/2020	Business Intelligence and analytics	2 Hr	PO 1,3,9,12	Mr. Sangram Nawale	BE	Ms. Yogita Fatangare
6	8/8/2020	Stress Management and Positive Mental Health	2 Hr	PO 6,9	Dr. Kiran Chavan	SE	Mr.Shantanu Pawar
7	5/9/2020	Teacher's Day	2 Hr	PO 9,10	ITSA team	Staff	Ms.Poonam Rakibe
8	19/9/2020	Engineer's Day	2 Hr	PO 8,9,10	Alumni	SE/TE/BE	Ms.Poonam Rakibe
9	31/8/2020 to 5/9/2020	Tech Arambh/ Tech Parva	1 Week	PO 6,7,8,9,10 ,11,12	Mr. Nagesh Rajopadhya Mr.Yash Gandhi, Mr.Omkar Nalawade Mr.Ajinkya Parakh, Mrs.Kanchan Dixit, Mrs. Vaidhehi Banerjee, Dr.Kiran Chavan	SE/TE	Mrs. S.A.Kulkarni and team
App Club: Deepak Tamhane							
10	19/9/2020	Session on Mini project development using JSP	2 Hr	PO5	Mr.Vallabh Hake	TE	Mr. Deepak Tamhane
GraphiX Club: Poonam Rakibe							
11	22/8/2020	How to prepare an effective presentation using various presentation and graphical tools	1Hr	PO5,8,9, 10	Mr.Nilesh Verma/ Mr.Soham Pawar	SE	Ms. Poonam Rakibe
12	22/8/2020	A quiz based on computer graphics subject	20 mins	PO 12	Ms.Ketki Gawali,/ Ms.Poonam Rakibe	TE,BE	Ms.Ketki Gawali

PixInsight Club: Suhasini Bhat							
13	12/09/2020	Video Making Competition (Theme: Boost your immunity against COVID-19)	1 Minute Video	PO6, PO9, PO10	Internal Faculties	All Students	Mrs. Suhasini L Bhat/ Ms.Shoma Mitkari
Audit Course: Ketki Gawali							
14	10/10/2020 & 17/10/2020	Aptitude & logical reasoning -(214450B-AC-3)	4 hrs	PO1,PO2	Internal Faculties	SE	Mr.Deepak Tamhane
15	30/8/2020 to 10/10/2020	Language Study -Japanese Module(214450C-AC-3) (started)	12hrs	PO10,PO 12	Mrs.Amita Godse	SE	Ms.Ketki Gawali
16	17/10/2020 & 24/10/2020	Professional Ethics(TE)	4 Hrs	PO8	Prof. Yashashree Jakhade	TE	Ms.Deepali Bhanage Naik
17	10/10/2020 & 17/10/2020	Green Computing (BE)	4Hrs	PO 7	Internal Faculties	BE	Ms.Shoma Mitkari/ Mr.Rohit Tate
CSI/ACM: V.G.Dixit							
18	6/11/2020	Seminar on You 3.0 (CSI)	1 Hr	PO6,8,10, 12	Mr. Amit Dangle & Mr. Anand Tamboli	TE/BE	Mrs.V.G.Dixit
19	5/9/2020 - 26/9/2020	Webinar :Industry 4.0 (ACM)	4hrs	PO 4,5,9,10,11,12	Mr.Darshankar, Mr. Mahesh Deshpande	TE,BE	Ms.Asmita Pawar
Soft Skill Training and Placement (T&P): Vishnu Kamble							
20	25/7/20	How to prepare for Competitive Coding & Placements in IT/Software companies	2hrs	PO 12	Mrs.Mamta Kumari,co-founder, PrepBytes	SE,TE,BE	Mrs.Ketki M Gawali
21	20/08/20 to 21/08/20	Preparation for Competitive examination and Higher studies	2HR/day	PO 12	Mr. Sudharshan Shingade (AIO,Mumbai)	**SE**	Mr.Vishnu Kamble/ Mr.Digvijay Patil
ED Activities: Digvijay Patil							
22	06/09/20	Udyojak-Entrepreneurship Development Program	4 Hrs	PO6,8	Mr.Pramod (CEO,Produer SW)	SE,TE,BE	Mr.Digvijay Patil
Career Guidance/Competitive Examinations: Vishnu Kamble							
23	01/10/20	Career options in Higher Education	2 Hrs	PO12	Wayne state university	SE,TE,BE	Mr.Vishnu Kamble
24	15/10/20	Preparation for GATE and Competitive examination a	2 Hrs	PO12	-	SE,TE,BE	Mr.Vishnu Kamble/ Mr.Digvijay Patil
FDP: Yogita Fatangare							
25	11/6/2020 to	FDP on ICT	5 days	PO 5	Mrs.Sampada Kulkarni,	IT and Computer	Mrs. Sampada Kulkarni &

	17/6/2020				Mr.Digvijay Patil, Mr.Santosh N	Faculties	Mr.Digvijay Patil
26	3/7/2020	FOP on Soft Skill	1 day	PO 9,10,12	Mrs.Vaidhehi Banerjee, Mrs.Yashashree Jakhade, Mrs.Deepali Londhe, Mrs. Ankita Tidke	Faculty of SPPU	Mrs.Swapna Bhavsar, Ms.Ketki Gawali
Alumni Activities: Vishnu Kamble/Mrs. Swapna Bhavsar							
27	15/08/20 to 17/08/20	Workshop on Website development	3Hrs/Day	PO3,4,5, 10,12	Mr.Vallabh Hake	SE,TE,BE	Mr.Deepak Tamhane
28	22/8/2020	How to prepare an effective presentation using various presentation and graphical tools	1Hr	PO5,8,9, 10	Mr.Nilesh Verma/ Mr.Soham Pawar	SE	Ms. Poonam Rakibe
29	27/9/2020	Tech Aarambh	3Hrs	PO 4,5	Yash Gandhi/ Omkar Nalwade	SE	Mrs.S.A.Kulkarni and team
30	27/9/2020	Tech Parv	3 Hrs	PO 5	Ajinkya Parakh Yogesh Rasal	TE	Mrs.S.A.Kulkarni and team

TIME TABLE TE A

DAY \ TIME	11.00 to 11.30	11.40 to 12.10	12.20 to 12.50	12.50 to 1.20	1.20 to 2.20	2.20 to 3.20
MON	ELEC-II (DAB,CAG)	ELEC-I (YDF, SDD)	ICS (DT)	R	Computer Laboratory-VII (ML) (AAP)	
TUE	SDM (SAK)	ICS (DT)	ML (AAP)	E	Computer Laboratory-VII (ICS) (DT)	
WED	ELEC-I (YDF, SDD)	ELEC-II (DAB,CAG)	ICS (DT)	C	Computer Laboratory-VIII (SAK)	
THU	ELEC-II (DAB,CAG)	SDM (SAK)	ML (AAP)	E	Computer Laboratory-VIII (SAK)	
FRI	SDM (SAK)	ML (AAP)	ELEC-I (YDF, SDD)	SS	Computer Laboratory-VII (ICS) (DT)	
DAY \ TIME	**11.00 TO 12.00**	**12.00 TO 1.00**	**1.00 to 2.00**			
SAT	Computer Laboratory-VII (ML) (AAP)					

GFM : - Mr. Deepak Tamhane

Name of the Subject	Teaching Staff & Seating Arrangement
ICS : Information and Cyber Security	DT : Mr. Deepak Tamhane
ML : Machine Learning and Applications	AAP : Ms. Asmita Pawar
SDM : Software Design and Modeling	SAK : Mrs. Sampada Kulkarni
ELEC - I WC : Wireless Communication UE: Usability Engineering BAI : Business Analytics & Intelligence	SDD : Mrs. S. D. Deshpande SB : Ms. Suhasini Bhat YDF : Ms. Yogita Fatangare
ELEC - II SC : Soft Computing ELEC-II STQA : Software Testing & Quality Assurance	CAG : Mr. C. A. Ghuge DAB : Ms. D. A. Bhanage
Computer Laboratory - VII	AAP : Ms. Asmita Pawar DT : Mr. Deepak Tamhane
Computer Laboratory - VIII	SAK : Mrs. Sampada Kulkarni

TIME TABLE TE B

DAY \ TIME	11.00 to 11.30	11.40 to 12.10	12.20 to 12.50	12.50 to 1.20	1.20 to 2.20	2.20 to 3.20
MON	ELEC-II (VSK, CAG)	ELEC-I (YDF, SDD)	ICS (JJ)	R	Computer Laboratory-VII (ML) (VGD)	
TUE	SDM (AD)	ICS (JJ)	ML (VGD)	E	Computer Laboratory-VII (ICS) (JJ)	
WED	ELEC-I (YDF, SDD)	ELEC-II (VSK, CAG)	ICS (JJ)	C	Computer Laboratory-VIII (AD)	
THU	ELEC-II (VSK, CAG)	SDM (AD)	ML (VGD)	E	Computer Laboratory-VIII (AD)	
FRI	SDM (AD)	ML (VGD)	ELEC-I (YDF, SDD)	SS	Computer Laboratory-VII (ICS) (JJ)	
DAY \ TIME	**11.00 TO 12.00**	**12.00 TO 1.00**	**1.00 to 2.00**			
SAT	Computer Laboratory-VII (ML) (VGD)					

GFM : - Ms. Jyoti Jadhav

Name of the Subject	Teaching Staff & Seating Arrangement
ICS : Information and Cyber Security	JJ : Ms. Jyoti Jadhav
ML : Machine Learning and Applications	VGD : Mrs. Vandana Dixit
SDM : Software Design and Modeling	AD : Ms. Anita Devkar
ELEC - I WC : Wireless Communication UE: Usability Engineering BAI : Business Analytics & Intelligence	SDD : Mrs. S. D. Deshpande SB : Ms. Suhasini Bhat YDF : Ms. Yogita Fatangare
ELEC - II SC : Soft Computing ELEC-II STQA : Software Testing & Quality Assurance	CAG : Mr. C. A. Ghuge VSK : Mr. V. S. Kamble
Computer Laboratory - VII	VGD : Mrs. Vandana Dixit JJ : Ms. Jyoti Jadhav
Computer Laboratory - VIII	AD : Ms. Anita Devkar

COURSE STRUCTURE

SEMESTER-I

Subject Code	Subject	Teaching Scheme			Examination Scheme					Total Marks	Credits
		Lecture	Practical	Tutorial	In-Sem	TW	PR	OR	End-Sem		
414453	Information and Cyber Security	3	--	--	30	--	--	--	70	100	3
414454	Machine Learning and Applications	4	--	--	30	--	--	--	70	100	4
414455	Software Design and Modeling	3	--	--	30	--	--	--	70	100	3
414456	Elective-I	3	--	--	30	--	--	--	70	100	3
414457	Elective -II	3	--	--	30	--	--	--	70	100	3
414458	Computer Laboratory-VII	--	4	--	--	50	50	--	--	100	2
414459	Computer Laboratory-VIII	--	4	--	--	50	--	50	--	100	2
414460	Project Phase-I	--	--	2	--	--	--	50	--	50	2
414461	Audit Course-V	--	--	--	--	--	--	--	--	Grade	
Total		16	8	2	150	100	50	100	350	750	22
Total of Part-I		26				750					

IMPORTANT INSTRUCTIONS

1. It is essential that the student attends all classes in time from the first day to the last day of each term.
2. Minimum of 75% attendance for lectures and practical sessions is mandatory for all students.
3. In case the attendance falls below 75% , term will not be granted and the student will not be allowed to appear for the University examination
4. Student should complete term work such as Journals, Files as per schedule. If the student fails to complete the term work to the entire satisfaction of the Head of the Department his/her term will not be granted and he/she will not be allowed to appear for the University examination.
5. Attendance to all class tests or internals exams is compulsory.
6. Students are always required to carry Identity card (duly signed by Authority) everyday to college and shall show the same on demand by any faculty/official of the Institute in the campus.
7. Students are advised to maintain good rapport with classmates and staff.
8. Institute uniform is compulsory on specified days, during University examinations, for internal tests and special functions decently dressed on the other days of the week.

TERM WORK EVALUATION CRITERIA

Final term work will be given based on throughout performance of the student. 100 marks are distributed in (60 for continuous assessment + 15 for internal test result + 5 for general behavior + 20 for attendance of student)

- 60 marks shall be awarded to the students, based on their journal work, which includes experiment's write up, program print out. Each assignment should be evaluated for 10 marks.
  - Distribution of 10 marks for each assignment is as follows:

Sr. No.	Head	Marks
i.	Coding standards, proper indentation, Comments, Documentation	2 Marks
ii.	Timely submission	3 Marks
iii.	Test cases / originality / Understanding of Assignment	5 Marks

- 15 marks shall be allotted based on the marks of Class test/ Assessment test per unit/ mock exam.
- 5 marks for General Behavior.
- 20 Marks as per the college policy for Term Work, marks are to be awarded for attendance as per the below, based on the percentage of attendance per subject, combining lectures and practical's together, wherever applicable.

Sr .No	%of attendee=total(Lectures + Practical's attended)	Marks
1	90 to 100	20

2	85to<90	16
3	80to<85	12
4	75 to <80	10

EXAM EVALUATION CRITERIA

University Examination

Insem : Theory examination of 30 marks, 60/90 minutes duration based on unit I, unit II and unit III of the subject

University Practical Examination of 50 marks oral/ practical duration 3 hr, contain problem statement based on assignment submitted as term work during lab hours Each chit will have 3 problem statements

- Every student will pick up one chit randomly and will perform one assignment/experiment out of three written on his/her chit.
- Practical examination will be based on the term work.
- Oral examination (if applicable i.e. in case of Oral as a separate passing head) will be based on journal and theory syllabus
- Questions will be asked during the practical examination to judge the understanding of the practical performed in the examination

Note: student will be allowed for university practical examination only when, all types of assignments given by respective staff and Satisfying attendance criteria

End Sem : Theory examination of 70 marks, 150/180 minutes duration, based on all the units of the subject, shall be conducted at the end of semester as per the schedule of the university.

Internal Examination
Pre in sem Test:
Theory examination of 30 marks, 1 Hour duration based on unit I, II and III of the subject.

Pre end sem Test:

Theory examination of 30 marks, 1 Hour duration based on unit IV, V and VI of the subject.

414453
Information and Cyber Security

SYLLABUS

Prerequisites:

1. Data Communication.
2. Computer Network.

Course Objectives:

1. Understand computer, network and information security.
2. To study operating system security and malwares.
3. To study security issues in internet protocols.
4. To study network defence tools.
5. To learn forensics and investigation techniques.

Course Outcomes:

By the end of the course, students should be able to

1. Elaborate the essentials of the Information Security.
2. Demonstrate the role of principle concepts with major issues for modeling a secure System.
3. To develop computer forensic awareness.
4. Make use of Cyber Security with Modern tools and Methods

UNIT I: SECURITY BASICS: **7 Hours**

Information Security Concepts, Security Threats and Vulnerabilities, Security Architectures and Operational Models, Types of Security attacks, Goals of Security, Malicious code, Intrusion detection system (IDS): Need, Types, Limitations and Challenges, security and privacy.

UNIT II: SYMMETRIC AND ASYMMETRIC KEY CRYPTOGRAPHY: 7 Hours

Introduction, Classical Encryption Techniques, Block Ciphers and Data Encryption standards, Advanced Encryption standard, Public Key Cryptography and RSA, Diffie-Hellman, Elgamal Curve Arithmetic, Elliptic Curve arithmetic, Elliptic Curve cryptography

UNIT III: DATA INTEGRITY ALGORITHMS AND SECURITY REQUIREMENTS:

7Hours

Cryptographic Hash Functions, requirements and security, SHA, SHA-3, Digital Signatures, X.509 Certificate, Kerberos, IP Security: Architecture Protocols IPv4, IPv6, AH, EPS, ISAKMP, Web Security: SSL, HTTPS, Mail Security: PGP, S/MIME

UNIT IV: LEGAL, ETHICAL, AND PROFESSIONAL ISSUES IN INFORMATION SECURITY, RISK MANAGEMENT: 7 Hours

Overview, Risk identification, Risk Assessment, Risk Control Strategies, Quantitative vs. Qualitative Risk Control Practices. Risk Management. Laws and Ethics in Information Security, Codes of Ethics, Protecting programs and data.

UNIT V: INTRODUCTION TO CYBER LAWS: 7 Hours

Introduction, Definition and origin, Cybercrime and Information security, Classification of Cybercrimes, The legal perspectives- Indian perspective, Global perspective, Categories of Cybercrime, Types of Attacks, a Social Engineering, Cyber stalking, Cloud Computing and Cybercrime.

UNIT VI: TOOLS AND METHODS USED IN CYBERCRIME: 7 Hours

Introduction, Proxy servers and Anonymizers, Phishing, Password Cracking, Key-loggers and Spywares, Types of Virus, Worms, Dos and DDoS, SQL injection, Cybercrime and Legal perspectives, Cyber laws- Indian context, The Indian IT Act-Challenges, Amendments, Challenges to Indian Law and cybercrime Scenario in India, Indian IT Act and Digital Signatures. Study of any two network security scanners: Nmap, Metasploit, OpenVAS, Aircrack, Snort, Wireshark, Nikito, Samurai, Safe 3 etc.

a) Text Books

1. William Stallings, Computer Security : Principles and Practices, Pearson 6th Ed, ISBN: 978-0-13-335469-0
2. Nina Godbole, Sunit Belapure , Cyber Security- Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiely India Pvt.Ltd, ISBN- 978-81-265- 2179-1
3. Bernard Menezes, Network Security and Cryptography, Cengage Learning , ISBN- 978-81-315-1349-1
4. Dr. V.K. Pachghare, Cryptography and Information security, PHI, Second edition,
ISBN- 978-81-203-5082-3

b) Reference Books

1. Bruice Schneier , Applied Cryptography- Protocols, Algorithms and Source code in C, Algorithms, Wiely India Pvt Ltd, 2nd Edition, ISBN 978-81-265-1368-0
2. Nina Godbole , Information Systems Security , Wiley India Pvt. Ltd, ISBN -978-81- 265-1692-6
3. CK Shyamala et el., Cryptography and Security , Wiley India Pvt. Ltd, ISBN-978-81- 265-2285-9
4. Berouz Forouzan, Cryptography and Network Security, TMH, 2 edition, ISBN -978- 00-707-0208-0

5. Mark Merkow, Information Security-Principles and Practices, Pearson Ed. , ISBN- 978-81-317-1288-7

COURSE OUTCOMES

CO No.	Course Outcome	Mapping With Unit	Assessment Technique	Blooms Taxonomy Category
C414453.1	Elaborate the essentials of the Information Security	I	Unit Test	Creating
C414453.2	Demonstrate the role of principle concepts with major issues for modeling a secure system.	II,III	Unit Test	Understanding
C414453.3	To develop computer forensic awareness	IV,V	Unit Test	Applying
C414453.4	Make use of Cyber Security with Modern tools and Methods	VI	Unit Test	Applying

references

PREREQUISITES

Sr. No.	Unit Number	Prerequisite subject name
1.	I	Data Communication
2.	II	Number Theory
3.	III	Number Theory, Computer Network
4.	IV	Computer Network
5.	V	Computer Network
6.	VI	Computer Network

TEACHING PLAN

Academic Year: - 2020-21 Semester :- I w. e. f. :- 17th June 2020

Class : - BE Division: A/B

Subject: - ICS 414453 Subject Code: - 414453

Faculty In charge: - Mr. Deepak Tamhane, Ms. Jyoti Jadhav No. of Lectures/ weeks: 03

- Lecture Plan

Sr. No.	Unit No.	Unit/ Topic Name	Start Date	End Date
1.	I	Security Basics	4th week (June)	5th week (June)
2.	II	Symmetric And Asymmetric Key Cryptography.	1st week (July)	2nd week (July)
3.	III	Data Integrity Algorithms And Security Requirements:	3rd week (July)	4th week (July)
4.	IV	Legal, Ethical, And Professional Issues In Information Security, Risk Management	3rd week (August)	4th week (August)
5.	V	Introduction To Cyber Laws:	1st week (September)	2nd week (September)

6.	VI	Tools And Methods Used In Cybercrime:	3rd week (September)	4th week (September)

Detailed Teaching Plan

Lect. No	Unit No.	Main Topic to be Covered	Sub Topics to be Covered	Chap. No. & Reference Books	CO to Attain	Measurable to Attain CO	Mode of Delivery
1	I	**SECURITY BASICS**	Information Security Concepts, Security Threats and Vulnerabilities	Chapter:1 William Stallings, Computer Security: Principles and Practices, Pearson 6th Ed, ISBN:978-0-13-335469-0	C414453.1	Unit Test-1	PPTs and Video Lectures
2			Security Architectures Models				
3			Operational Models				
4			Types of Security attacks, Goals of Security				
5			Malicious code				
6			Intrusion detection system (IDS): Need, Types, Limitations and Challenges, security and privacy				
7			Intrusion detection system (IDS): Need, Types, Limitations and Challenges, security				

			and privacy				
8	II	**SYMMETRIC AND ASYMMETRIC KEY CRYPTOGRAP**	Introduction, Classical Encryption Techniques	Chapter:1,2,4,8 William Stallings, Computer Security: Principles and Practices, Pearson 6th	C414453.2	Unit Test-2	PPTs and Video Lectures
9			Block Ciphers and Data Encryption standards				
10			Advanced Encryption standard				
11			**Public Key Cryptography and RSA**				
12			**Diffie-Hellman, Elgamal Curve Arithmetic**				
13			**Elliptic Curve arithmetic**				
14			**Elliptic Curve cryptography**				
15			**Cryptographic Hash Functions, requirements and security**				
16			**SHA, SHA-3**				
17			**Digital Signatures, X.509 Certificate**				
18			**Kerberos**				
19			**IP Security: Architecture**				

			Protocols IPv4, IPv6, AH, EPS, ISAKMP				
20			**Web Security: SSL, HTTPS,**				
21			**Mail Security: PGP, S/MIME**				
22			**Overview, Risk identification**				
23			**Risk Assessment**				
24			**Risk Control Strategies**				
25			**Quantitative vs. Qualitative Risk Control Practices**				
26			**Risk Management**				
27			**Laws and Ethics in Information Security**				
28			**Codes of Ethics, Protecting programs and data**				
29			**Introduction, Definition and origin**				
30			**Cybercrime and Information security, Classification of Cybercrimes**				
31			**The legalperspectives-**				

			Indian perspective				
32			**Global perspective**				
33			**Categories of Cybercrime**				
34			**Types of Attacks, a Social Engineering, Cyber stalking**				
35			**Cloud Computing and Cybercrime**				
36			**Introduction, Proxy servers and Anonymizers**				
37			**Phishing, Password Cracking, Key-loggers and Spywares**				
38			**Types of Virus, Worms, Dos and DDoS, SQL injection**				
39			**Cybercrime and Legal Perspectives**				
40			**Cyber laws- Indian context, The Indian IT Act-Challenges**				
41			**Amendments, Challenges to Indian Law and cybercrime Scenario**				

			in India				
			study of any				
42			**two network security scanners: Nmap, Metasploit, OpenVAS, Aircrack, Snort,**				
			Wireshark, Nikito,				
			Samurai, Safe 3 etc				

UNIT WISE

Unit I

Sr. No.	Question	CO No.	Marks	University Year
1	Explain various categories of Intrusion Detection System	C414453.1	8	Dec 2016
2	Distinguish between transposition and substitution ciphers.		5	Insem 2015
3	List and briefly define categories of security services		5	Insem 2015
4	Explain Active and passive attacks and active attacks in detail		6	Oct 2017
5	Distinguish between linear cryptanalysis and differential cryptanalysis.		4	Oct 2017
6	Explain different IDS methods with one example each.		8	Oct 2017
7	Give the types of attacks with examples.		4	April 2017
8	Explain in brief: Trap doors, Trojan Horses, Worms and Zombies		8	April 2017
9	List and briefly define types of cryptanalytic attacks based on what is known to attacker.		6	Oct 2016
10	Explain IDS by comparing host based and network based IDS.		6	
11	List and briefly define categories of security services		6	
12	List and briefly define categories of security mechanisms.		6	

Unit II

Sr. No.	Question	CO No.	Marks	University Year
1	Explain the term confussion and diffusion with example.	C41445 3.2	5	May 2016
2	State the Euclid's algorithm with example.		5	May 2016
3	State the Chinese remainder theorem with example		6	Dec 2015
4	What is meant by modular arithmetic and exponentiation?		5	May 2016
5	What are possible attacks on DES		5	May 2016
6	In a public key cryptosystem RSA, given n=187 and the encryption key (e) as 17, find out the corresponding private key d?		4	Dec 2015
7	Draw AES block diagram and explain the steps in detail.		6	Dec 2015/ Oct 2017
8	Explain X.509 standard for digital certificate.		6	Dec 2015
9	Explain permutation and substitution steps in DES algorithm.		4	Dec 2015
10	Using Euclidean algorithm calculate a. GCD(48,30) b. GCD(105,80)		4	Dec 2015
11	Determine the value of x using Chinese remainder theorem.		6	Insem

	a. X = 1(mod 5) b. X = 6(mod 7) c. X = 8(mod11)		BE	2015

12	Explain block cipher modes of operation (ECB, CBC, CFB, OFB and counter mode) with help of block diagram.		10	Insem 2015
13	Describe advantages and disadvantages of DES algorithm.		6	Insem 2015
14	What is the significance of Extended Euclidian algorithm with reference to RSA algorithm? Illustrate.		4	Insem 2015
15	Let the given data be – prime numbers p=11, q=19and the plain text to be sent is 40. Assume public key e as 23. Using RSA algorithm determine the cipher text of the given plain text. Also perform the reverse process of finding the plain text form the cipher text.		6	Insem 2015
16	Explain man-in-the-middle attack in Diffie-Hellman key exchange		6	Insem 2015
17	Discuss the key management with respect to following issues: a. Key generation b. Key distribution c. Key Updation		4	Insem 2015
18	State the Euclid's algorithm with example.		6	Oct 2017
19	Compute the inverse of 17 in mod 23 arithmetic. Show steps clearly.		6	April 2017
20	State Euler's Theorem.		4	April 2017
21	In Diffie-Hellman key exchange between two parties A and B where A picks his secret key as 9 and B picks his secret key as 6. Apply 13 as the primitive root of 19, for this diffie-hellman key exchange and show the shared secret. Show the math working steps clearly		4	April 2017
22	What do you mean by cryptanalysis? Show the applications of public key cryptography.		6	April 2017
23	List out the problems of one time pad.		4	April 2017
24	Write down the purpose of S-box in DES		6	April 2017
25	Determine GCD(24140,16762)		4	Oct 2016
26	Using the extended Euclidean algorithm, find the multiplicative inverse of a. 1234 mod 4321 b. 24140 mod 40902		6	Oct 2016
27	What is the difference between Monoalphabetic cipher and Polyalphabetic cipher?		4	Oct 2016
28	What is Steganography?		4	

29	What the difference is between block and stream cipher?		4	

Unit III

Sr. No.	Question	CO No.	Marks	University Year
1	Draw the block diagram of SHA-1 and state the general steps in the process.	C414453	5	May 2016
2	List the benefits of IPSec. Distinguish between tunnel and transport mode in IPSec.	.2	8	May 2016
3	What is the purpose of SSL record layer protocol and handshake protocol?		8	May 2016 / Oct 2017
4	What problem was Kerberos designed to address. Describe Kerberos realm.		6	Dec 2015
5	Discuss SSL with respect to four phases a. Establish Security Capabilities b. Server authentication and key exchange c. Client Authentication and key exchange d. Finish		8	Dec 2018
6	How AH and ESP are different while working under transport and tunnel mode.		8	Dec 2018
7	Compare and contrast MD5 and SHA1.		4	Insem 2015
8	Enlist the requirement of hash function and explain the working of MD5 algorithm in detail.		6	Oct 2017
9	What is Kerberos?		2	Oct 2017
10	Explain Diffie-Hellman key exchange algorithm with example		5	Oct 2017
11	Describe briefly how IPSec works and enlist its application? Distinguish between tunnel and transport of IPSec.		8	Oct 2017
12	Consider the following threats to web security and describe how each is countered by particular feature of SSL. a. Brute Force Attacks. b. Known plaintext attacks. c. Replay attacks. d. Man-in-the-middle attacks. e. Password Sniffing. f. IP Snoofing.		16	April 2017

	g. IP hijacking. h. SYN Flooding.			
13	What is the difference between tunnel and transport mode in IPSec and how does it defend replay attacks.		8	April 2017
14	What protocols comprise SSL? What is the difference between SSL connection and SSL session?		8	April 2017
15	What characteristics are needed in secure hash function?		6	Oct 2016
16	In what order should the signature function and security function be applied to a message, and why?		4	Oct 2016
17	What are the properties a digital signature should have?		6	Oct 2016
18	What four requirements were defined for Kerberos?		4	Oct 2016
19	Give examples of applications of IPSec. What services are provided by IPSec? What is the difference between tunnel and transport mode in IPSec		8	Oct 2016
20	What services are provided by SSL Record Protocol? What steps are involved in SSL Record protocol transmission?		8	Oct 2016

Unit IV

Sr. No.	Question	CO No.	Marks	University Year
1	Define information security and cyber security with example	C41 44 53 .3	6	Dec 2016
2	Explain with example how social engineering is playing wide role in cyber crime.		10	Dec 2016
3	Explain in detail Information security policy.		8	
4	Explain risk identification and risk assessment in details		5	
5	What are the different risk control strategies		5/8	
6	Give the difference between quantitative and qualitative risk		4	
	control practices			
7	How to protect programs and data		4	

Unit V

Sr. No.	Question	CO No.	Marks	University Year
1	Explain the types of cyber crime in detail.	C41 44 53 .3	8 / 10	May 2016 / Oct 2017
2	Describe the Indian and global legal perspective on cyber crime. / Write a short note on Indian Legal Perspective.		8 / 6	May 2016/ Oct 2017
3	What is Cyber Stalking? Types of stalker (online and offline). / What is Cyber Stalking? Explain the types of stalker		8/10	May 2016 / Oct 2017
4	Explain what are the different attacks launched with attack vector.		8	May 2016
5	Describe the classification of cyber crime.		10	Dec 2016
6	Address security issues in cloud computing.		6	Oct 2017
7	Write notes on: a. Cyberstalking b. Cybercrime and cloud computing c. Phishing		18	April 2017
8	What are social engineering attacks? Classify and explain them.		8	Oct 2016
9	What is Cyberstalking? Explain cyberstalking and explain how it		8	Oct 2016

	works.			
10	Classify and explain cybercrimes against property		8	Oct 2018
11	In your view, is the issue of digital certificate adequately addressed in Indian IT act? Explain, Why?		8	

Unit VI

Sr. No.	Question	CO No.	Marks	University Year
1	What is the difference between proxy server and anonymizers.	C4	8	May 2016
2	Explain phishing and password hacking	1	10	May 2016
3	Write Short note on: a. Indian It Act 2000 and its challenges b. SQL Injection Write short notes on the following. a. Key Loggers and Spywares b. Indian IT Act and its challenges c. SQL Injection and Digital Signatures	44 53 .4	12 / 18	May 2016 / Oct 2017
4	What is SQL Injection? Explain in detail.		8	Dec 2016
5	Write Short notes on: a. Indian IT Act b. Different ways of password hacking		10	Dec 2016
6	Define and Differentiate a. Proxy server and an anonymizer b. DOS and DDOS c. Virus and Worm		18	Dec 2016
7	Define and Differentiate Phishing and Pharming? Describe key loggers and spyware in brief.		6	Oct 2017
8	Write short note on following: a. Host based Malicious program: Trap Door, Logic Bombs and Trojan Horse b. Virus and Worm c. Proxy server and anonymizer		18	Oct 2017
9	Is there a difference between cyber crime and cyber fraud? Explain.		8	
10	Write a short note on Snort tool		6	

Unit Wise Home Assignments

Unit I

Sr. No.	Question	CO No.	Marks	University Year
1	Which is best answer for various categories of Intrusion Detection System?	C414453.1	8	Dec 2016
2	What can you say about the types of attacks with examples?		6	April 2017
3	How would you summarize the following : Trap doors, Trojan Horses, Worms and Zombies ?		8	April 2017
4	List and briefly define categories of security services.		5	Insem 2015

Unit II

Sr. No.	Question	CO No.	Marks	University Year
1	How would you solve Euclid's algorithm with example.	C414453.2	6	May 2016
2	How would you use public key cryptosystem RSA if the given n=187 and the encryption key (e) as 17 to find out the corresponding private key d?		4	Dec 2015
3	What would the result if the value of x using Chinese remainder theorem. a. X = 1(mod 5) b. X = 6(mod 7) c. X = 8(mod11)		6	Insem 2015
4	Describe advantages and disadvantages of DES algorithm.		5	Insem 2015

Unit III

Sr. No.	Question	CO No.	Mar	University

			ks	Year
1	How would you show your understanding of block diagram of SHA-1 and the general steps in the process.	C414453.2	6	May 2016
2	List the benefits of IPSec. Distinguish between tunnel and transport mode in IPSec.		6	May 2016
3	What problem was Kerberos designed to address. Describe Kerberos realm.		6	Insem Dec 2015
4	What is the difference between tunnel and transport mode in IPSec and how does it defend replay attacks.		6	April 2017

Unit IV

Sr. No.	Question	CO No.	Marks	University Year
1	What is information security and cyber security with example?	C41 4453 .3	6	Dec 2016
2	How would you describe Information security policy in detail?		4	
3	How would you explain the risk identification and risk assessment in details?		6	
4	What are the different risk control strategies?		6	

Unit V

Sr. No.	Question	CO No.	Marks	University Year
1	What is Cyber Stalking? Types of stalker (online and offline). What is Cyber Stalking? Explain the types of stalker?	C41 4453 .3	8/10	May 2016,Oct 2017
2	How can you explain the different attacks launched with attack vector?		8	May 2016
3	What are the cybercrimes against property?		8	Oct 2016
4	How would you explain the classification of cybercrime?		10	Dec 2016

Unit VI

Sr.	Question	CO No.	Mar	Univers

No.			ks	ity Year
1	What facts would you select to show to explain phishing and password hacking?	C41 4453 .4	10	May 2016
2	How can you Differentiate a. Proxy server and an anonymizer b. DOS and DDOS c. Virus and Worm		10	Dec 2016
3	How would you use the proxy server and anonymizers and explain the briefly.		8	May 2016
4	Write a short note on Snort tool		8	

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Additional Resources

Nil

414454
Machine Learning and Applications

SYLLABUS

Savitribai Phule Pune University

Fourth Year of Information Technology (2015 Course)

414454: Machine Learning and Applications

Teaching Scheme: TH:04 Hrs/Wk	Credits: 04	Examination Scheme:
		In-Sem (Paper): 30 Marks End-Sem (paper): 70 Marks

Prerequisites:

Linear Algebra and Calculus, Probability Basics

Course Objectives:

1. Understanding Human learning aspects.
2. Understanding primitives and methods in learning process by computer.
3. Understanding nature of problems solved with Machine Learning.

Course Outcomes:

By the end of the course, students should be able to

1. Model the learning primitives.
2. Build the learning model.
3. Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.

Unit I	INTRODUCTION TO MACHINE LEARNING	8 Hrs

Introduction: What is Machine Learning, Examples of Machine Learning applications, Training versus Testing, Positive and Negative Class, Cross-validation.

Types of Learning: Supervised, Unsupervised and Semi-Supervised Learning.

Dimensionality Reduction: Introduction to Dimensionality Reduction, Subset Selection, Introduction to Principal Component Analysis.

Unit II	**CLASSIFICATION**	**8 Hrs**

Binary and Multiclass Classification: Assessing Classification Performance, Handling more than two classes, Multiclass Classification-One vs One, One vs Rest Linear Models: Perceptron,

Support Vector Machines (SVM), Soft Margin SVM, Kernel methods for non-linearity

Unit III	**REGRESSION AND GENERALIZATION**	**8 Hrs**

Regression: Assessing performance of Regression – Error measures, Overfitting and Underfitting, Catalysts for Overfitting, VC Dimensions

Linear Models: Least Square method, Univariate Regression, Multivariate Linear Regression, Regularized Regression - Ridge Regression and Lasso

Theory of Generalization: Bias and Variance Dilemma, Training and Testing Curves Case Study of

Polynomial Curve Fitting.

Unit IV	**LOGIC BASED AND ALGEBRAIC MODELS**	**8 Hrs**

Distance Based Models: Neighbors and Examples, Nearest Neighbor Classification, Distance based clustering algorithms - K-means and K-medoids, Hierarchical clustering.

Rule Based Models: Rule learning for subgroup discovery, Association rules

mining – Apriori Algorithm, Confidence and Support parameters.

Tree Based Models: Decision Trees, Minority Class, Impurity Measures – Gini Index and Entropy,

Best Split.

Unit V	PROBABILISTIC MODELS	8 Hrs

Conditional Probability, Joint Probability, Probability Density Function, Normal Distribution and its Geometric Interpretation, Naïve Bayes Classifier, Discriminative Learning with Maximum Likelihood. Probabilistic Models with Hidden variables: Expectation-Maximization methods,

Gaussian Mixtures

Unit VI	TRENDS IN MACHINE LEARNING	8 Hrs

Ensemble Learning: Combining Multiple Models, Bagging, Randomization, Boosting, Stacking Reinforcement Learning: Exploration, Exploitation, Rewards, Penalties

Deep Learning: The Neuron, Expressing Linear Perceptron as Neurons, Feed Forward Neural

Networks, Linear Neurons and their Limitations, Sigmoid, Tanh and ReLU Neurons

Text Books

1. Ethem Alpaydin: Introduction to Machine Learning, PHI 2nd Edition-2013.
2. Peter Flach: Machine Learning: The Art and Science of Algorithms that Make Sense of Data, Cambridge University Press, Edition 2012.

Reference Books

1. C. M. Bishop: Pattern Recognition and Machine Learning, Springer 1st Edition-2013.
2. Ian H Witten, Eibe Frank, Mark A Hall: Data Mining, Practical Machine

Learning Tools and Techniques, Elsevier, 3rd Edition.

3. Parag Kulkarni: Reinforcement Learning and Systemic Machine Learning for Decision Making, IEEE Press, Reprint 2015.
4. Nikhil Buduma: Fundamentals of Deep Learning, O'Reilly Media, June 2017.
5. Hastie, Tibshirani, Friedman: Introduction to Statistical Machine Learning with Applications in R, Springer, 2nd Edition 2012.
6. Kevin P Murphy: Machine Learning – A Probabilistic Perspective, MIT Press, August 2012.

COURSE OUTCOMES

CO No.	Course Outcome	Mapping With Unit	Assessment Technique	Blooms Taxonomy Category
C414454.1	Model the learning primitives.	I, II	Unit Test	Understanding
C414454.2	Build the learning model.	III, IV	Unit Test	Creating
C414454.3	Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.	V, VI	Unit Test	Analyzing

PREREQUISITES

Sr. No.	Unit No.	Prerequisite subject name
1.	I	NA
2.	II	Linear Algebra and Calculus
3.	III	Linear Algebra and Calculus
4.	IV	Linear Algebra and Calculus
5.	V	Probabilistic Basics
6.	VI	NA

TEACHING PLAN

TEACHING PLAN

Academic Year:-21-22 Semester :-I w. e. f. :-

Class : - BE Division:A & B

Subject :- Machine Learning and Applications Subject Code :- 414454

Faculty In charge :-Mrs. V.G.Dixit, Ms. A. A. Pawar No. of Lectures/ weeks: 4

- **Lecture Plan**

Sr. No.	Unit No.	Unit/ Topic Name	Start week	End week
1.	I	Introduction To Machine Learning	3 rd week of june	1 st week of july
2.	II	Classification	1st week of july	3rd week of july
3.	III	Regression And Generalization	3rd week of july	1 st week of august
4.	IV	Logic Based And Algebraic Models	3rd week of august	5th week of august
5.	V	Probabilistic Models	1st week of September	2nd week of august
6.	VI	Trends In Machine Learning	3rd week of august	4th week of august

Detail Teaching Plan (Both Shifts)

No	Unit No.	Main Topic to be Covered	Sub Topics to be Covered	Chap. No. & Reference Books	CO to Attain	Measurable to attain CO	Mode of Delivery
1.	I	Introduction To Machine Learning	Why Machine learning	Alpaydin : 1.1	C414454.1	Test	PPT,
2.			Examples of Machine Learning applications	Alpaydin : 1.2			
3.			Training versus Testing, Positive and Negative Class	Alpaydin : 2			
4.			Cross-validation				
5.			Types of Learning: Supervised, Unsupervised & Semi-Supervised Learning				
6.			Dimensionality Reduction: Introduction to DR	Alpaydin : 6			
7.			Subset Selection				
8.			Introduction to Principal Component Analysis				
9.	II	Classification	Binary & Multiclass Classification:Assessing Classification performance	Flach: 2	C414454.1	Test	PPT, Video

10.			Assessing Classification Performance				
11.			Handling more than two classes				
12.			Multiclass Classification- One vs One, One vs Rest				
13.			Linear Models: Perceptron	Bishop : 4 Flach : 7			
14.			Support Vector Machines (SVM)				
15.			Soft Margin SVM				
16.			Kernel methods for non-linearity				
17.	**III**	**Regression And Generalization**	Regression: Assessing performance of Regression	Flach: 3, Bishop : 1, Alpaydin : 2 Hastie, Tibshirani, Friedman:	C41445 4.2	Test	PPT, Video
18.			Error measures, Overfitting and Underfitting				
19.			Catalysts for Overfitting, VC Dimensions				
20.			Linear Models: LSM, Univariate Regression				

21.			Multivariate Linear Regression				
22.	**III**	**Regression And Generalization**	Regularized Regression - Ridge Regression & Lasso	Flach: 3, Bishop : 1, Alpaydin : 2 Hastie, Tibshirani, Friedman:	C41445 4.2	Test	PPT, Video
23.			Theory of Generalization: Bias and Variance Dilemma				
24.			Training & Testing Curves				
25.			Case Study of Polynomial Curve Fitting				
26.	**Assessment**						
27.	**IV**	**Logic Based And Algebraic Models**	Distance Based Models: Neighbours and Examples, NN Classification	Flach: 8, Witten : 6, Hastie: 14	C41445 4.2	Test	PPT, Video
28.			Distance based clustering algorithms-K means & K-medaoids, Hierarchical clustering				
29.			Rule Based Models: Rule learning for subgroup discovery				
30.			Association rules mining – Apriori Algo, Confidence &				

			Support parameters.				
31.			Tree Based Models: Decision Trees				
32.			Minority Class, Impurity Measures- Gini Index				
33.			Entropy, Best Split				
34.			Cond. Prob., Joint Prob				
35.			Probability Density Function, Normal Distribution & its Geometric Interpretation				
36.			Naïve Bayes Classifier				
37.	**V**	**Probabilistic Models**	Discriminative Learning with Maximum Likelihood	Flach: 2, Murphy: 2	C41445 4.3	Test	PPT, Video
38.			Probabilistic Models with Hidden variables				
39.			Expectation-Maxi methods				
40.			Gaussian Mixtures				
41.	**VI**	**Trends In Machine**	Ensemble Learning : Combining multiple	Flach, Witten : 8,	C41445	Test	PPT, Video

			models and Symbols				
42.			Bagging, Randomization, Boosting, Stacking				
43.			Reinforcement Learning: Exploration, Exploitation, Rewards, Penalties				
44.		**Learning**	Deep Learning: The Neuron	PK: 1, Buduma : 1	4.3		
45.			Expressing Linear Perceptron as Neurons				
46.			Feed Forward Neural Networks				
47.			Linear Neurons and their Limitations				
48.			Sigmoid, Tanh and ReLU Neurons				
49.	**Assessment**						

HOME ASSIGNMENTS

Unit I

Sr. No.	Questions	CO No	Marks	University Year
1.	What is machine learning? Give an overview of machine learning with suitable diagram.	C414454.1	5	Aug 2015
2.	Explain in detail : i) Supervised Learning vs Unsupervised learning ii) Training dataset vs testing dataset	C414454.1	4	Aug 2015
3.	Define following terms with suitable example : i) Confusion matrix ii) False positive rate iii) True positive rate	C414454.1	4	Aug 2015
4.	Prove that - Accuracy=1-Error Rate	C414454.1	5	Dece2015
5.	Explain TP,TN,FP,FN	C414454.1	5	May 2016
6.	Explain training dataset and testing dataset	C414454.1	5	Dece 2016
7.	Write mathematical form of following 1)Classification 2)Class Probability Estimation 3)Regression	C414454.1	5	May 2017
8.	Prove with an example FP=Neg-TN	C414454.1	5	May 2017
9.	Justify use of machine learning to solve the following task "**Prediction of sale value of a car based on the locality of the property**"	C414454.1	5	May 2017
10.	Explain ML applications in following areas: a. Health Care	C414454.1	5	May 2017

	b. Online Shopping c. Face Recognition d. Share Market			
Unit II Classification				
1.	Explain Perceptron training algorithm for linear classification.	C414454.1	6	Aug 2015
2.	Derive and explain output code matrix for One Vs One and One Vs Rest Scheme for construction of Multi class classifier (for 3 classes)	C414454.1	6	August 2015
3.	Explain Perceptron with suitable example	C414454.1	5	Dece2016
4.	Derive and explain output code matrix for One vs One and One vs Rest scheme for construction of Multiclass classifier for three classes.	C414454.1	6	Dece2017
5.	Explain SVM in detail.	C414454.1	5	May 2017
6.	Explain soft margin SVM	C414454.1	5	
7.	What is kernel method for non linearity?	C414454.1	5	
8.	What is difference between binary and multiclass classification?	C414454.1	8	
9.	What are the characteristics of Confusion Matrix for Multi Class classification?	C414454.1	5	
10.	Derive the performance measures from Confusion Matrix for Multi Class classification.	C414454.1	5	
11.	Calculate Precision, Accuracy & Error rate for TN= 191152, FP=3813, FN=9764, TP=19648	C414454.1	8	
12.	Calculate TPR, TNR, FPR & FNR for TN= .852, FP=.017, FN=.044, TP=.088	C414454.1	8	
Unit III Regression And Generalization				
1.	What is overfitting? Specify the reasons for overfitting.	C414454.2	4	Aug 2015

2.	Explain regression using least square method.	C414454.2	6	Aug 2015
3.	What is multivariate regression? Explain its equation using homogeneous coordinates.	C414454.2	4	Aug 2015
4.	Explain Ridge Regression and Lasso Regression	C414454.2	5	Dece. 2015
5.	Explain term Bias variance Dilemma	C414454.2	5	Dece2015
6.	Explain least square method	C414454.2	5	May 2016
7.	What is multivariate regression? How it will be different from univariate regression?	C414454.2	5	May 2016
8.	When is it suitable to use linear regression over classification?	C414454.2	5	Dece 2016
9.	Why we do to realized in regularized regression	C414454.2	5	Dece 2016
10.	Define and explain regression with its model.	C414454.2	4	Dece. 2017
11.	How the performance of regression function is measured?	C414454.2	4	December 2017
12.	Define and describe logistic regression.	C414454.2	8	Dece2017
13.	Explain VC Dimension.	C414454.2	8	
14.	Explain catalysts for overfitting.	C414454.2	8	
15.	Explain polynomial curve fitting.	C414454.2	8	
	Unit IV Logic Based And Algebraic Models			
1.	Explain support and Confidence. Calculate support and Confidence of following **Transaction** / **Item** 1 / Nappie 2 / Beer,Crisp 3 / Apples,nappies 4 / Beer, crisps,nappie	C414454.2	8	Dece2015 Dece2016

	5 Apples 6 Apples,beer,crisps,nappie 7 Apple,crisps 8 Crisps			
2.	Define Frequent Itemset, support, confidence, market basket analysis	C414454.2	8	May 2016
3.	Explain k-means Clustering with example	C414454.2	10	Dece2015
4.	Explain k-means Algorithm	C414454.2	9	May 2016
5.	Write a note on clustering trees	C414454.2	9	Dece 2016
6.	Find all 3-item itemsets from this set with minimum support =2 Trans_id Itemlist T1 {K, A, D, B} T2 {D, A, C, E, B} T3 {C, A, B, E} T4 {B, A, D}	C414454.2	9	May 2017
7.	Write short note on decision trees.	C414454.2	5	
8.	Explain gini index and entropy in detail	C414454.2	8	
9.	What is Association Rule Mining?	C414454.2	8	
10.	Explain Apriori Algorithm.	C414454.2	8	
Unit V Probabilistic Models				
1.	Explain geometric models and probabilistic models of machine learning in detail.	C414454.3	5	Aug2015
2.	Explain Naïve Bayes Classification Algorithm	C414454.3	8	Dece2015
3.	Is Naïve Bayes algorithm is supervised or unsupervised? Explain how it achieves the task you specified?	C414454.3	8	Dece2016
4.	Explain naïve bayes classification algorithm	C414454.3	8	May 2017
5.	What is probabilistic model? Give an example of it	C414454.3	4	Dece 2017

6.	Explain types of probability.	C414454.3	5	
7.	Explain Discriminative Learning with Maximum Likelihood.	C414454.3	8	
8.	Explain Gaussian Mixture.	C414454.3	5	
9.	What is probability density function?	C414454.3	5	
10.	Explain conditional probability.	C414454.3	5	
11.	What is the difference between Medoids and Centroids?	C414454.3	4	
Unit VI Trends In Machine Learning				
1.	Explain Bagging and Boosting of Ensemble Method	C414454.3	8	Dece 2015
2.	Explain ensemble learning?	C414454.3	8	
3.	Write a note on Ensemble learning.	C414454.3	8	Dece2016
4.	Explain penalty and reward in reinforcement learning.	C414454.3	8	May 2017
5.	What is Randomization?	C414454.3	8	
6.	Write a short note on Deep Learning.	C414454.3	8	
7.	Explain Linear Neurons and their Limitations	C414454.3	8	
8.	What is Sigmoid?	C414454.3	5	
9.	Explain Tanh and ReLU Neurons.	C414454.3	8	
10.	Explain Feed Forward Neural Networks	C414454.3	8	
11.	Explain Reinforcement learning with exploration, exploitation, rewards and penalties.	C414454.3	8	

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ADDITIONAL RESOURCES

1. https://www.cs.waikato.ac.nz/ml/weka/
2. https://machinelearningmastery.com/what-is-the-weka-machine-learning-workbench/
3. https://www.rstudio.com/
4. https://www.rstudio.com/products/rstudio/download2/
5. https://www.analyticsvidhya.com/blog/2015/07/dimension-reduction-methods/
6. https://towardsdatascience.com/a-one-stop-shop-for-principal-component-analysis-55

314443 Software Design and Modeling

SYLLABUS

414455: Software Design and Modeling		
Teaching Scheme: TH:03Hours/Week	**Credits: 03**	**Examination Scheme:** **In-Sem (Paper): 30 Marks** **End-Sem (paper): 70 Marks**

Prerequisites:

1. Problem Solving & Object-Oriented Programming
2. Software Engineering and Project Management
3. Database Management System

Course Objectives:

1. To teach the student the fundamental aspects of different object oriented methodologies and unified approach along with Unified Modeling Language (UML), in terms of "how to use" it for the purpose of specifying and developing software.
2. Explore and analyze use case modeling, domain/ class modeling.
3. To teach the student Interaction and Behavior Modeling,
4. Aware students with design process in software development
5. Orient students with the software design principles and patterns
6. Enable students to learn the architectural design guidelines in various type of application development

Course Outcomes:

By the end of the course, students should be able to

1. Understand object oriented methodologies, basics of Unified Modeling Language (UML).
2. Understand analysis process, use case modeling, domain/class modeling
3. Understand interaction and behavior modeling.
4. Understand design process and business, access and view layer class design
5. Get started on study of GRASP principles and GoF design patterns.
6. Get started on study of architectural design principles and guidelines in the

various type of application development.

Unit I	OBJECT ORIENTED METHODOLOGIES, UML	7 Hrs

Views of Software Developments: Traditional System Development Methodology and Object Oriented Analysis and Design, Importance Object –Orientation Some of the object Oriented Methodology:- Object Oriented Design –Booch, Object Modeling Techniques – Rumbaugh, Object – Oriented Analysis - Cood Yourdon, Object – Oriented Software Engineering – Ivar Jacobson Unified Approach: Object Oriented Analysis, Object Oriented Design, Iterative Development & Continuous Testing, Modeling Based on UML, Layered Approach, Unified Modeling Language: Introduction to Modeling & UML, MDA, UML Structure, UML Building Blocks, UML Common Mechanisms, Introduction to all UML Diagram Notational Techniques, 4+1 View.

Unit II	OBJECT ORIENTED ANALYSIS	7 Hrs

Object Oriented Analysis Process, Use Case Modeling: Actor Identification, Actor Classification, Actor Generalization, Use Cases Identification, Communication, Uses/Include and Extend Associations, Writing a Formal Use Cases, Use Case realizations

Domain / Class Modeling: Approaches For Identifying Classes (Noun-Phase Approach, Common Class Pattern Approach, Class Responsibilities Collaboration Approach, Naming Classes, Class Associations and Identification of Associations, generalization/Specialization Relationship, Aggregation and Composition Relationships, Attributes and Methods Identification.

Unit III	INTERACTION AND BEHAVIOR MODELING	7 Hrs

Activity Diagram : Activity and Actions, Initial and Final Activity, Activity Edge, Decision and Merge Points, Fork and Join, Input and Output Pins, Activity Group, Activity Partitions, Constraints on Action, Swim Lanes

Sequence Diagram: Context, Objects and Roles, Links, Object Life Line, Message or stimulus, Activation/Focus of Control, Modeling Interactions,

Collaboration Diagram :Objects and Links, Messages and stimuli, Active Objects, Communication Diagram, Iteration Expression, Parallel Execution, Guard Expression, Timing Diagram

State Diagram : State Machine, Triggers and Ports, Transitions, Initial and Final State,

Composite States, Submachine States		
Unit IV	**OBJECT ORIENTED DESIGN**	**7 Hrs**
Object Oriented Design Process Designing Business Layer : Object Oriented Constraints Language (OCL), Designing Business Classes : The Process, Designing Well Defined Class Visibility, Attribute Refinement, Method Design Using UML Activity Diagram, Packaging and Managing Classes. Designing Access Layer: Object Relational Systems, Object Relation Mapping, Table Class Mapping, Table – Inherited Classes Mapping, Designing the Access Layer Classes: The Process, Designing View Layer : View Layer Classes Design, Identifying View Classes by Analyzing Use Cases, Macro-Level Design Process, Prototyping the User Interface Component and Deployment Design using Component and Deployment Diagram.		
Unit V	**DESIGN PRINCIPLES AND PATTERNS**	**7 Hrs**
Introduction to Patterns General Responsibility Assignment Software Patterns (GRASP) : Introduction, Creator , Information Expert, Low coupling, Controller, High Cohesion, Polymorphism , Pure fabrication, Indirection, Protected Variations Gang of Four (GoF): Introduction, Categories of Patterns (Creational, Structural and Behavioral Patterns), Singleton, Adapter, State, and Strategy.		
Unit VI	**ARCHITECTURAL DESIGN**	**7 Hrs**
Overview of software Architecture, Designing Client / Server Software Architectures, Designing Service Oriented Software Architectures, Designing Component Based Software Architectures, Designing Concurrent and Real-Time Software Architectures, Designing Product Line Architectures, Related Case Studies.		

Text Books

1. Ali Bahrami, Object Oriented System Development: Using Unified Modeling Language, McGraw-Hill, International Editions 1999,ISBN:0-07-116090-6
2. Craig Larman, Applying UML and Patterns, Pearson Education, Second Edition,ISBN:978- 0130925695
3. Erich Gamma et al, Design Patterns: Elements of Reusable Object, Pearson, First Edition,ISBN:9789332555402, 9332555400

Reference Books

1. Martin Fowler, UML Distilled, Pearson, Third Edition, ISBN:978-81-317-1565-9
2. Dan Pilone, Neil Pitman, UML in Nutshell, O'reilly Pub.,ISBN:8184040024, 9788184040029
3. Roger S. Pressman, Software Engineering: A Practitioner's Approach, McGraw Hill, Seventh Edition ,ISBN:9339212088, 9789339212087
4. Hassan Gomaa, Software Modeling And Design UML, Use Cases, Pattern, & Software Architectures, Cambridge University Press, ISBN:978-0-521-76414-8
5. JIM Arlow, Ila Neustadt, UML 2 and the Unified Process, Pearson, Second Edition, ISBN:9788131700549 Tom Pender, UML 2 Bible, Wiley India, ISBN:9788126504527

COURSE OUTCOMES

CO No.	Course Outcome	Mapping With Unit	Assessment Technique	Blooms Taxonomy Category
C414455.1	Understand object oriented methodologies, basics of Unified Modeling Language	I	Unit Test I	II. Understanding
C414455.2	Understand analysis process, use case modeling, domain/class modeling	II		III. Applying
C414455.3	Understand interaction and behavior modeling.	III		III. Applying
C414455.4	Understand design process and business, access and view layer class design	IV	Unit Test II	II. Understanding
C414455.5	Get started on study of GRASP principles and GoF design patterns.	V		I. Remembering
C414455.6	Get started on study of architectural design principles and guidelines in the various type of application development.	VI		I. Remembering

PREREQUISITES

references

Sr. No.	Unit Number	Prerequisite subject name
1.	I	Problem Solving and object-oriented Programming, Software Engineering and Project Management.
2.	II	Problem Solving and object-oriented Programming & Database Management System
3.	III	Problem Solving and object-oriented Programming
4.	IV	Problem Solving and object-oriented Programming & Database Management System
5.	V	Problem Solving and object-oriented Programming
6.	VI	Software Engineering and Project Management

TEACHING PLAN

Teaching Plan Short

Session :- 2020 - 2021 Semester :- I w. e. f. :- 1 /07/ 2021
Year : - B.E.

Subject :- Software Design And Modeling Subject Code :- 414455

Faculty In charge :- MsSampada Kulkarni & Ms. Anita L. Devkar

No. of Lectures per Weeks: 03

- **Lecture Plan**

Sr. No.	Unit No.	Unit/ Topic Name	Start Date	End Date
1.	I	Object oriented methodologies, UML	July Week1	July Week3
2.	II	Object oriented analysis	July Week3	August Week1
3.	III	Interaction and behavior modeling	August Week 1	August Week3
4.	IV	Object oriented design	August Week3	August Week5
5.	V	Design principles and patterns	August Week5	Sep Week1
6.	VI	Architectural design	Sep Week1	Sep Week2

Detail Teaching Plan

Lect . No	Unit No.	Main Topic to be Covered	Sub Topics to be Covered	Chap. No. & Reference Books	CO	Measurable to attain CO	Mode of Delivery
1	**I OBJECTORIENTED METHODOLOGIES, UML**	**Views of Software Developments**	Traditional System Development Methodology and Object Oriented Analysis and Design, Importance Object –Orientation	**Chapter 1** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO1	Unit Test-I	Chalk & Talk,PPT
2		**Some of the object Oriented Methodology:-**	Object Oriented Design –Booch, Object Modeling Techniques – Rumbaugh, Object – Oriented Analysis - Cood Yourdon, Object – Oriented Software Engineering – Ivar Jacobson	**Chapter 4** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO1		Chalk & Talk, PPT
3		**Unified Approach:**	Object Oriented Analysis, Object Oriented Design, Iterative Development & Continuous Testing, Modeling Based on UML, Layered Approach	**Chapter 4** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO1		Chalk & Talk, PPT
4.		**Unified Modeling Language:**	Introduction to Modeling & UML,	**Chapter 1** UML 2 and The Unified Process Practical Object Oriented Analysis and Design By Jim Arlow Ila Neustadt Pearson	CO1		Chalk & Talk PPT
5.			MDA, UML Structure, UML Building Blocks, UML Common Mechanisms, 4+1 View.		CO1		Chalk & Talk PPT

6		**Introduction to all UML Diagram Notational Techniques**	introduction all UML Diagram and syntax used in UML	**Chapter 5** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO1	Unit Test-I	Chalk & Talk, PPT
7			introduction all UML Diagram and syntax used in UML				
8 & 9	**II OBJECTORIENTED ANALYSIS**	**Object Oriented Analysis Process, Use Case Modeling:**	Actor Identification, Actor Classification, Actor Generalization, Use Cases Identification, Communication, Uses/Include and Extend Associations,	**Chapter 6** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO2		Chalk & Talk, PPT, Video(NPTEL)
10		**Writing a Formal Use Cases**	How to write use case. Identify actors, usecases, relationships, system boundary	**Chapter 6** Software Engineering A Practitioner Approach (7e) by Roger S. Pressman McGraw Hill	CO2		Chalk & Talk, PPT, NPTEL Video
11		**Use Case realizations**	Association, Generalization, include, extend	**Chapter 12** UML 2 and The Unified Process Practical Object Oriented Analysis and Design By Jim Arlow Ila Neustadt (Pearson)	CO2		Chalk & Talk, PPT, NPTEL Video
12		**Domain / Class Modeling:**	Approaches For Identifying Classes (Noun-Phase Approach, Common Class Pattern Approach,	**Chapter 7** Object Oriented System	CO2	Unit Test-I	Chalk & Talk, PPT&NP

			Class Responsibilities Collaboration Approach), Naming Classes, (Case Studies: Class Diagram)	Development by Ali Bahrami Tata McGraw Hi**l**			TEL Video
13			Class Associations and Identification of Associations, Generalization/Specialization Relationship, Aggregation and Composition Relationships, Attributes and Methods Identification.	**Chapter 8** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO2		Chalk & Talk, PPT, NPTEL Video
14		**Case Study: Problem Solving**	Various Examples and Problem Solving on Case Studies: Class Diagram	Previous Years Insem Papers, Questions from OOMD with UML by Rumbaugh & Blaha.	CO2		Chalk & Talk
15 & 16	**UNITS III INTERACTION AND BEHAVIOR MO**	**Activity Diagram**	Activity and Actions, Initial and Final Activity, Activity Edge, Decision and Merge Points, Fork and Join, Input and Output Pins, Activity Group, Activity Partitions, Constraints on Action, Swim Lanes. Case Studies to generate activity diagram	**Chapter 13** UML 2 Bible By Tom Pender	CO3		Chalk & Talk, PPT, NPTEL Video
17 & 18		**Sequence Diagram:**	Context, Objects and Roles, Links, Object Life Line, Message or stimulus, Activation/Focus of Control, Modeling Interactions. Collaboration Diagram: Objects and Links, Messages and stimuli,	**Chapter 9** UML 2 Bible By Tom Pender	CO3	Unit Test-I	Chalk & Talk, PPT, NPTEL Video

	DELING		Active Objects, Communication Diagram, Iteration Expression, Parallel Execution, Guard Expression, Timing Diagram Case Studies				
19 & 20		**State Diagram:**	State Machine, Triggers and Ports, Transitions, Initial and Final State, Composite States, Submachine States. Case Studies	**Chapter 11** UML 2 Bible By Tom Pender	CO3		Chalk & Talk PPT, NPTEL Video
21		**Case Study: Problem Solving**	Real time case study to design activity, sequence and state model	Previous Years Insem Papers, Questions from OOMD with UML by Rumbaugh & Blaha.	CO3		Chalk & Talk
22	**UNITS IV OBJECTORIENTED DESIGN**	**Object Oriented Design Process**	Object Oriented Design Process	**Chapter 9** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO3	Unit Test-II	Chalk & Talk, PPT
23		**Designing Business Layer :**	Object Oriented Constraints Language (OCL),	**Chapter 10** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO3		Chalk & Talk, PPT
24		**Designing Business Classes :**	The Process, Designing Well Defined Class Visibility, Attribute Refinement, Method Design Using UML Activity Diagram, Packaging and Managing Classes.		CO3		Chalk & Talk, PPT
25		**Designing Access**	Object Relational Systems,	**Chapter 11**	CO 4		Chalk &

		Layer	Object Relation Mapping, Table Class Mapping, Table – Inherited Classes Mapping, Designing the Access Layer Classes: The Process, Example Case study	Object Oriented System Development by Ali Bahrami Tata McGraw Hill **Chapter 15** Software Modeling and Design by Hassan Gomaa			Talk PPT
26		**Designing View Layer**	View Layer Classes Design, Identifying View Classes by Analyzing Use Cases, Macro-Level Design Process, and Prototyping the User Interface	**Chapter 12** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO 4		Chalk & Talk PPT
27			Component and Deployment Design using Component and Deployment Diagram	**Chapter 15 and 17** UML 2 Bible By Tom Pender	CO 4		Chalk & Talk PPT
28			Case Study	Previous Years Ensem Papers			Chalk & Talk
29	**UNITS V DESIGN PRINCIPLES AND**	**Introduction to Patterns**	What is Design pattern, Importance of design pattern, types of design pattern	**Chapter 4** Object Oriented System Development by Ali Bahrami Tata McGraw Hill	CO 5		Chalk & Talk PPT
30		**General Responsibility Assignment Software Patterns (GRASP)**	Introduction, Creator , Information Expert, Low coupling, Controller,	**Chapter 17 and 25** Applying UML and Pattern (3e)	CO 5		Chalk & Talk PPT

	PATTERNS			Craig Larman Pearson Education			
31			High Cohesion, Polymorphism, Pure fabrication, Indirection, Protected Variations.	**Chapter 17 and 25** Applying UML and Pattern (3e) Craig Larman Pearson Education	CO 5		Chalk & Talk PPT
32		**Gang of Four (GoF)**	Introduction, Categories of Patterns (Creational, Structural and Behavioral Patterns),	**Chapter 1** Design Patterns by Erich Gamma Richard Helm Ralph Jonson John Vlissides	CO 5		Chalk & Talk PPT
33			Singleton, Adapter. implementation	**Chapter 3,4** Design Patterns by Erich Gamma Richard Helm Ralph Jonson John Vlissides	CO 5		Chalk & Talk PPT
34			State, and Strategy implementation	**Chapter 5** Design Patterns by Erich Gamma Richard Helm Ralph Jonson John Vlissides	CO 5		Chalk & Talk PPT
35	**UNITS VI ARCHITECTURA**	**Overview of software Architecture**		**Chapter 12** Software Modeling and Design by Hassan Gomaa	CO 6		Chalk & Talk PPT
36		**Designing Client / Server Software Architectures**		**Chapter 15** Software Modeling and	CO 6		Chalk & Talk PPT

	L DES IGN			Design by Hassan Gomaa			
37		**Designing Service Oriented Software Architectures**		**Chapter 16** Software Modeling and Design by Hassan Gomaa	CO 6		Chalk & Talk PPT
38		**Designing Component Based Software Architectures**		**Chapter 17** Software Modeling and Design by Hassan Gomaa	CO 6		Chalk & Talk PPT
39		**Designing Concurrent and Real-Time Software Architectures**		**Chapter 18** Software Modeling and Design by Hassan Gomaa	CO 6		Chalk & Talk PPT
40		**Designing Product Line Architectures**		**Chapter 19** Software Modeling and Design by Hassan Gomaa	CO 6		Chalk & Talk PPT

HOME ASSIGNMENT

Unit I

Sr. No.	Question	CO No.	Marks	University Year
1	State in your own worlds Four Common Mechanisms of UML?	C414455.1	5	August-2018
2	Illustrate the advantages of object oriented development.		5	
3	Draw 4+1 View Architecture of UML and explain the significance of every view.		5	Oct-2019
4	Summarize in brief "Micro and Macro development process" of Grady Booch.		5	August-2018
5	Elaborate three building blocks of UML		5	August-2018
6	Explain process and component of unified approach with neat diagram		5	May-2019

Unit-II

Sr. No.	Question	CO No.	Marks	University Year
1	Draw a simple class diagram of EMS (Employee Management System scenario by applying the following keywords class, association name, association end name, qualified association and multiplicity.	C414455.2	5	
2	How would "Class Identification Approaches" helpful to identify appropriate classes? Explain any two approaches and state examples of classes by applying it.		5	
3	Given the following problem description, produce an object oriented solution. Answer the following questions about your object-oriented solution. Design a simulation of a basketball conference. Each conference has 10 teams. Each team has 12 players. Each player has a specific height, speed, and accuracy. Players know which team they belong to. Some players are scholarship players. Scholarship players need to record their current grade-point average. Players may be transferred between teams. Teams play basketball games against other teams in the conference. The result of each game is determined using a function based on the height, strength, speed, and accuracy of the players on each team. • Identify all software classes, their attributes & methods. • Draw a Software class diagram showing associations between classes and multiplicities. • Which objects contain other objects? • Which objects exhibit super-class sub-class relationship?		5	Dec-2018

4	Draw a use case diagram with appropriate relationships and notations for the following description. Consider software that manages electronic music files. Some use cases are 'view songs by title', view songs by artist, 'view songs by album', play a song', 'play an album', 'randomize order'. You can add an appropriate parent use case for use case generalization.		5	August-2017
5	ABC Finance Company has given the following software requirements to develop a system. The company has many branches which are grouped into zones. Each zone has a zonal head office which manages the branches in that zone. Each Zonal head office has a Zonal Manager. Each company branch can have many deposit accounts and loans accounts. Account can be of either of Type Individual or type corporate. Customers can open either an account of type individual or type corporate. The customer can also procure loans from the company. Assume any missing information: Identify Actor and Use cases and draw use case diagram.		5	Dec-2019

Unit-III

Sr. No.	Question	CO No.	Marks	University Year
1	Construct the activity diagram of given description using Swim lanes. A customer decided to purchase a DVD player. He begins by calling the sales department of DVD shop. They tell him to talk to customer support. He then calls customer support. They put him on hold while taking to engineering. Finally customer support tells the customer about several DVD player option. Customer chose the DVD player and makes a payment to accounts department. The DVD player is shipped by the dispatch department customer receive the DVD player.	C414455.3	5	August-2018
2	Draw the sequence diagram for case study Online Course Reservation System: The requirement form the customer is got and the requirements about the course registration are defined. The requirements are analyzed and defined so that is enables the student to efficiency select a course through registration system. Whenever the student comes to join the course he/ she should be provided with the list of course available in the college. The system should maintain a list of professor who is teaching the course. At the end of the course the student must be provided with the certificate for the completion of the course.		5	
3	Draw a simple communication diagram of Online Book shop scenario by applying the following keywords Frame, messages,		5	

	lifeline, Parallel Execution, Guard Expression			
4	Draw a state diagram for the ATM machine. ATM machine is idle until an ATM card is inserted. Then it becomes active. Within being in the active state, it validates the card (validating) first. After card validation, it can process a transaction like (transaction processing) a withdrawal or deposit cash or a view balance or print receipt. After the processing is complete, card is ejected and it goes to idle state.		5	
5	Make use of a state chart diagram to explain where to use composite state and concurrent state with an example.		5	Oct-2019, Nov-2018

Unit-IV

Sr. No.	Question	CO No.	Marks	University Year
1	What is the purpose of the access layer? Explain the major tasks carried out in the access layer.	C414455.4	5	Dec-2019
2	Explain port, provided interface and required interface with an example		5	
3	Explain the view layer class design technique.		5	Dec-2019
4	Write the purpose of deployment diagram. Draw and explain the following elements of deployment diagram: a. Node b. Artifact		5	
5	Explain the concept of Object Constraint Language (OCL) with example		5	Dec-2019

Unit-V

Sr. No.	Question	CO No.	Marks	University Year
1	Write the classification, motivation, class diagram and uses of State design patten.	C414455.5	5	Dec-2018
2	What is design pattern? Explain 4 essential elements of patterns.		5	Dec- 2018
3	Write the classification, motivation, class diagram and uses of singleton design patten.		5	
4	What is GRASP? Explain the following GRASP pattern: Creator, information expert.		5	Dec-2019
5	Explain the design pattern documentation.		5	May 2017

Unit-VI

Sr. No.	Question	CO No.	Marks	University Year
1	Write a short note on Control pattern for real time software architecture	C414455.6	5	Dec-2018
2	Explain multi-tier Client service software architecture service pattern.		5	Dec-2019
3	Write a short note on Designing Software Product Line Architectures.		5	
4	What is software architecture? Explain Architectural views in detail.		5	Dec-2018
5	What is a deployment diagram? What kind of architectural decisions/ scenarios does a deployment diagram depict? Show the following two tier web application scenario using a deployment diagram. Scenario: Browser based client using HTTP to access static web pages.		5	

QUESTION BANK

Unit I (Object Oriented Methodologies, UML)

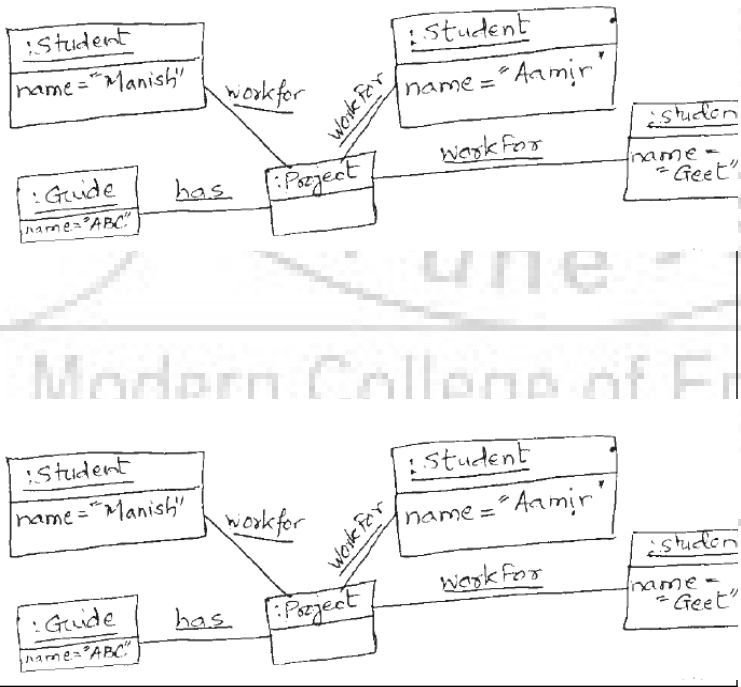
Que No	Question	CO	Marks	University Year
1.	Explain extended features of UML 2.0	C414455.1	6	2008 Pattern -4
2.	Give the OCL (Object Constraint Language) expression syntax with an example		4	2008 Pattern -4
3.	Write note on : MDA		6	2008 Pattern -3
4.	Write short note on common mechanism in UML		6	2008 Pattern -2
5.	What do you mean that some UML diagram show behavior of system? Explain with example		6	2008 Pattern
6.	Discuss when will you model a entiry such as 'bank account' as a. Attribute b. Class		4	2008 Pattern
7.	Can we use forward engineering in class diagram? Explain with appropriate example		8	2008 Pattern
8.	With the help of example explain extensibility mechanism of UML		6	2008 Pattern
9.	Explain 4+1 view architecture with corresponding UML diagram		8	2008 Pattern
10.	Show how stereotype, tagged values and constraints can be used to extend UML. Exmpain the concept by taking the example of modeling a 'Library Database Management System'		6	2008 Pattern
11.	What is system development methodology?		6	
12.	What are orthogonal views of software		4	
13.	What is object oriented system development methodology		6	
14.	How does object oriented approach different from the traditional top down approach		4/6	
15.	What are the advantages of object oriented development		6	
16.	Describe components of Unified approach		6	
17.	Describe difference between method and process		4	
18.	What are the phases of OMT (Object modeling techniques)? Briefly describe each phase		6	
19.	What is strength of OMT		4/6	
20.	Briefly describe Booch system development process		6	
21.	What is strength Booch system		4/6	
22.	What is Objectory"		6	
23.	What is strength of Jacobson methodology		6	
24.	What is model? Why do we need to model a problem		6	

25.	What are the different types of modeling? Briefly describe each		6	
26.	What is UML? What is importance of UML		6	
27.	What are some of UML dynamic diagrams		4	

Unit II (Object Oriented Analysis)

Que No	Question	CO	Marks	University Year
1.1	What is an association class? What is a ternary association? Elaborate both with an example.	414455.2	6	Dec 2015
2.	Draw a class diagram for the given description with appropriate relationships, relationship names, and multiplicity. A person owns multiple documents. Each document is composed of paragraphs that are, in turn, composed of characters. The copy operation propagates from document to paragraph to characters. Copying a paragraph copies all the characters in it. The operation does not propagate in reverse direction; a paragraph can be copied without copying the whole document		6	Dec 2015 Aug 2016
3.	Draw a class diagram for the given description with appropriate relationships, relationship names, and multiplicity. Fluorescent lamps and incandescent lamps are lamps. Base, cover, switch and wiring are all part of a lamp. Fluorescent lamp has a ballast, twist mount and starter, an incandescent lab has a socket.		3	Aug 2016
4.	In the context of use case diagram, elaborate what is include and extend with the help of an example.		4	Dec 2015
5.	With the context of class diagram show a qualified association and composition relationship with the help of one example each.		6	May 2016

6.	A project has three to five students. A project has guide a guide can guide one to three projects. For this description draw a class diagram. From the class diagram draw an object diagram to show two projects, seven students and one guide. Do not write any explanation, just draw the diagrams.		6	May 2016 Aug 2017
7.	Diagrammatically show generalization, include and extend relationship in the context of a use case diagram.		4	May 2016
8.	In the context of class diagram show a generalization and aggregation relationship with the help of one example each.		6	Dec 2016
9.	Draw a use case diagram with appropriate relationships and notations for the following description		4	Dec 2016
10.	Convert the following description into a class diagram. Show classes, relationships and multiplicities. In a university there are different classrooms, offices and departments. A department has a name and it contains many offices. A person working at the university has a unique ID and can be a professor or an employee. A professor can be an associate or assistant professor and he/she is enrolled in one department. Offices and classrooms have a number ID, and a classroom has a number of seats. Every employee works in an office.		6	Dec 2016
11.	Software is to be developed for an alarm clock simulation. User can choose a display mode of 12 hour display or 24 hour display. User can set time, user can set alarm, turn off alarm or snooze.		4	Dec 2016
12.	The use case login accepts the userid and password from the user. The system validates them and displays the message that 'Userld or password is invalid'. Draw a sequence diagram for this.		4	Dec 2016

13.	Draw a use case diagram with appropriate relationships and notations for the following description. Consider online travel planner software. Through this software, the user can book bus tickets, provide payment information, provide address, book a car on rent, book a hotel room. It is mandatory to provide payment information and provide address for booking of bus tickets, car on rent and a hotel room.	4	Dec 2016
14.	Elaborate the keywords class, association name, association end name and multiplicity with an example.	6	Dec 2016
15.	A file system has many files. A file can be ASCII file, binary file or directory file. Files are stored in a disk. Disk contains many tracks. A track is made up of many sectors. Convert this into a class diagram with appropriate relationships, multiplicity.	2	Aug 2015
16.	What is qualified association? Draw its notation in using an example	2	Aug 2015
17.	Construct a class diagram using the following object diagram. **[3]**  		Aug 2015
18.	What is n - ary association? Show with an example.		Aug 2015

19.	Convert the following into a class diagram with appropriate classes, relationships, multiplicity a) A computer program has many statements. An expression is a statement. A function is statement. An expression contains a variable, a constant, an operator. A relational operator is an operator. An arithmetic operator is an operator. A function has an argument list, a return type. **[3]** b) Car dealer sales cars. A car is owned by an owner. The owner has an address. The owner can be a person, a company or a bank. A car loan may be involved in the purchase of a car. Bank provides the loan. **[3]**		6	Dec 2016
20.	A drawing object is a text, a geometric object or a group. Group can contain at least two geometric objects. Point, polygon are geometricalobjects. A polygon is composed of an ordered set of points.		4	Aug 2015
21.	Consider software that manages electronic music files. Some use cases are *'view songs by title', view songs by artist,'view songs by album',* *play a song', 'play an album', 'randomize order'*. Prepare a use case diagram; include appropriate relationships for the use cases. You can add an appropriate parent use case for use case generalization.		5	Aug 2015 Aug 2016
22.	Draw a class diagram for generalization using keywords shape, close shape, openshape, line, circle, ellipse		4	Dec 2017

23.	For the following description identify which nouns can go as class and which cannot every employee fills up a self appraisal for. The self appraisal form has list of expectations. Each expectation has a description, self rating, appraiser's rating and justification. The appraisal form has overall rating. Based on the self assessment, every employee gives self rating in the range of 0 to 5 for each expectation [0 means 'expectations not met' and 5 means 'Expectation completely met']. Once completed, employee submits the appraisal form. Appraiser can view the appraisal form of subordinates		6	Dec 2017 May 2018
24.	Elaborate the steps to identify use cases of a system		4	Dec 2017
25.	Draw class diagram of the following description with identification of classes, appropriate relationships with multiplicity. A microcomputer is composed of 1 or more monitors, system, box, an optional mouse and a keyboard. A system box in turn has a chassis, a CPU, many RAM chips and an optional fan		3	Aug 2016
26.	Draw class diagram of the following description with identification of classes, appropriate relationships with multiplicity. A person works for company receives a salary and has a job title. Company maintains record for each person. Each person record has a unique employee Id, name and address. The boss evaluates the performance of each worker		3	Aug 2016
27.	Elaborate extend, include with the context of use case diagram using an example.		4	Dec 2016
28.	Elaborate on association, aggregation and composition with an example		4	Dec 2016

29.	Draw the class diagram for a banking system with two classes, Account and Customer. Customer can open a saving or a current account and can do deposit And withdraw transactions. Identify suitable attributes and operations for the classes.		6	
30.	Draw a class diagram for an online library system. Make suitable additional assumptions about scope and working of the system. Class diagram must show relevant attributes, methods relations and stereotype.		6	
31.	A musical company has decided to store information about musicians who perform in their albums. Each musician is identified with unique identifier. The instruments are used in songs. Song has title and an author. Each musician may play several instruments and a given instrument may be played by several musicians. Each album has exactly one musician who acts as its producer. A musician may produce several albums. Draw diagram class using advanced notations for given scenario.		8	
32.	Draw the class diagram for 'Purchase of book in library' mechanism. The library purchases works like this. A demand list of popular books is maintained, there is a catalog entry for the book title that tells that current number of copies of the books in library. Based on above factors a recommendation for purchase of a title is made. A set of bookshop has been identified from whom that recommended books are purchased. The purchase orders the specific bookshops are maintained in the system. Identify appropriate classes, their attributes, relationships and operations and show them in class diagram		8	

Unit III (Interaction and Behavioral Modeling)

Que No	Question	CO	Marks	University Year
1.	In the context of state diagram, what are concurrent substates? Elaborate with an example.	414455.3	4	Dec 2015
2.	Construct the activity diagram of the given description using swim lanes. A customer decides to purchase a DVD player. He begins by calling the sales department of the DVD shop. They tell him to talk to customer support. He then calls customer support; they put him on hold while talking to engineering. Finally customer support tells the customer about several DVD player options. The customer chooses a DVD player and makes payment to the accounts department. The DVD player is shipped by the dispatch department. The customer receives the DVD player.		6	Dec 2015
3.	Draw state diagram for ATM machine.ATM machine is idle until an ATM card is inserted. Then it becomes active. Within being in the active state, it validates the card (validating) first. After card validation, it can process a transaction like (transaction processing) a withdrawal or deposit cash or a view balance or print receipt. After the processing is complete, card is ejected and it goes to idle state.		6	Dec 2015
4.	State the steps to construct the domain state model.		4	Dec 2015
5.	With the context of state diagram, Define simple state, entry, do and exit.		4	May 2016 Dec 2016

6.	A Draw an activity diagram for a Passport Management System To get a new passport, an applicant has to apply on-line, get the appointment. He has to submit the documents in passport office on the date of appointment. In case of insufficient or incorrect documents, the applicant's has to reapply and get new appointment After submission of documents; applicant's verification is done by the police. On successful verification, passport is issued to the applicant. If verification is unsuccessful, applicant has to reapply for passport.		6	May 2016
7.	In the context of sequence diagram, what is an entity and a controller class?		4	May 2016
8.	In the context of state diagram, define state, trigger, guard and effect.		4	Dec 2016
9.	With the context of activity diagram, elaborate fork and join with the help of an example.		6	Dec 2016
10.	Draw a state diagram for a fax machine and show entry, exit and do behavior. Initially, the machine is in the idle state. It displays the date and time in this state. When the user dials a fax number, the machine remains in the idle state till the number dialing is complete. After the number is completely dialed, it goes into the faxing state. Being in this state, it prints the fax on the page, it pulls the page out, it paginates, puts a date, time and owner stamp at the end of the fax message which it prints. After the fax printing is complete, it goes back to idle state		6	Dec 2016
11.	Explain the expansion region in the context of activity diagram.		4	Dec 2016
12.	What is the relation between use cases and sequence diagram? Explain the keywords participants, time line, focus of control, synchronous message with respect to sequence diagram.		6	Dec 2016
13.	Elaborate composite state and concurrent state with an example.		4	Dec 2016

14.	The use case 'Login' accepts userid and password from the user. The system validates them and displays a message 'Log in is successful'. Draw a sequence diagram for this.		4	Dec 2015
15.	A simple digital watch has a display and two buttons, button 'A' and 'B' to set it. The watch has two modes of display, 'display time' mode and 'set time' mode. In the display time mode, the watch displays the hours and minutes separated by a flashing colon. The set time mode has two sub modes, set hours, and set minutes. The 'A' button selects modes. Each time it is pressed, the mode advances in a sequence: display time, set hours and set minutes. Within the sub modes , the B button advances the hours or minutes once each time it is pressed. Buttons must be released before they can generate another event. Prepare a state diagram of the watch.		5	Aug 2015 Aug 2016
16.	When the power is OFF a copying machine is OFF. When the power is ON, it starts warming. During warming it flashes the 'ready' light. When it is ready, it turns the ready light 'on' and displays the parameters on the display panel as number of copies = '1' and size = 'normal'. The operator may change any of the parameters when the machine is ready. The operator may increment the number of copies, change size. When the parameters are properly set, the operator pushes the start button. With this the machine starts copying. Copying proceeds until all copies are made. Again, the machine becomes ready. Draw the state diagram of this. Include entry, do, exit actions wherever appropriate.		5	Aug 2015 Aug 2016
17.	Elaborate fork and join in the context of activity diagram. Draw the notations of synchronous, asynchronous, return, create object and destroy object messages in the context of sequence diagram.		5	Aug 2015 Aug 2016

18.	Use the following details to draw the activity diagram when a customer visits a bank to withdraw money, she need to fill a pay slip and hand it over to bank employee. The bank employee issues a token to her. The customer waits till the token number is displayed at the cash counter. The bank employee checks the balance in the account and passes the slip for checking the signature. When the signature is verified and balance is adequate, the token number is displayed at the cash counter. The customer approaches the cash counter. The cashier gives the amount to her. She goes away from the counter		6	Dec 2017 May 2018
19.	Draw a sequence diagram for booking a ticket of one passenger from source to destination by railway. Assume that the seats in the railway are available		6	Dec 2017
20.	Show asynchronous, synchronous, create object and return message notations in the contex of sequence diagram		4	Dec 2017 May 2018
21.	Elaborate the concept of concurrent sub states in the contex of state diagram		4	Dec 2017 May 2018
22.	A vending machine has a coin insertion slit, a display panel and dispensing tray. At start. A vending machine is in IDLE state. Being into IDLE state, when the coins are inserted in the coin insertion slits, it ges to accepting coins state. When the amount becomes equal to the price of drink, it goes to select drink state. In this state, it asks for selection of drink. When it is selected, it goes into dispensing state. In this state it delivers the drink can in the dispensing tray and goes back to idle state. Identify the transitions and write those as trigger [guard condition] /effect in the state diagram		6	Dec 2017 May 2018

23.	Draw sequence diagram for 'Withdrawal of money from ATM system' represent following things. i. Alt Operator ii. Return Messages. iii. Self Call		[8]	
24.	Can we use activity diagram to represent concurrent flow? Explain with example.		[6]	
25.	Explain following terms related to state with example i. Entry/ Exit actions. ii. Deferred Events iii. Internal Transitions		[6]	
26.	Consider a use of a "Rent a car". A partial description of use case Follows. Customers rent online from choice of cars. A transaction of Renting car is hired, rate of hiring, etc. Payments can be done in various ways. Loyal customers with repeat business may be given discounts. Some of the likely classes are cars, Types cars, Rates card, customers, Transactions for renting the car, Renting car a controller object, payment, Rental GUI object to interact etc. Make additional suitable assumptions about the scope and Draw the SEQUENCE DIAGRAM showing actors, lifelines, objects, messages/ parameters, return values, interactions.		[8]	

27.	A candidate applies in a placement call for placement in a company. He can be placed in one of the companies registered with the placement call. The candidate's applications are sorted on aggregate percentage basics. Top students are selected for placement in the registered companies on merit basic. The joining process involves candidate being shown available companies. Candidate select membership of health club, food club and entertainment club. On successful placement he is given a selection letter and a copy of company schedule. A candidate not placed can select to register himself for waitlist. Draw an activity diagram for the described system making suitable assumption about scope.		[8]	

Unit IV (Object Oriented Design)

Sr. No.	Question	CO No.	Marks	University Year
1	Explain in detail Object Oriented Design Process with diagram.	C414455.4	8	-
2	What is the task of design? Why do we need analysis?		6	-
3	What are public and private protocols? What are the significance of separating these two protocols?		4	-
4	What are some characteristics of bad design?		4	-
5	Name some problems that are come from the lack of a well-designed protocol; for example giving every method and attribute public visibility.		4	-
6	Write a short note on Packages and managing classes.		4	-
7	How do design axioms help avoid design pitfalls?		4	-
8	Describe the process of creating the access layer classes.		8	-
9	Describe forward and reverse engineering.		4	-
10	Describe CORBA,ORB and DCOM.		6	-
11	What is relational database? Explain tuple, primary key, and foreign key.		4	-
12	Explain the process of designing view layer classes.		8	-
13	Write a note on Prototyping the user interface.		6	-
14	Why is user interface one of the most important components of		4	-

	any software?			
15	How can use cases help us design the view layer objects?		4	-
16	Describe the MACRO Process of view layer design.		4	-
17	Describe the UI design rules.		4	-
18	Under what circumstances can you use modes in your user interface?		4	-
19	Draw component diagram for online shopping system.		8	May 2017
20	Write the purpose of deployment diagram. Draw and explain the following element of deployment diagram. i) Node ii) Artifact iii) Node instance		8	May 2017

Unit V (Design Principles and Patterns)

Sr. No.	Question	CO No.	Marks	University Year
1	Elaborate the need of design patterns.	C414455.5	4	Dec 2017
2	Explain the use of state design patterns with example.		6	Dec 2017
3	Write the types of design pattern. Give one example of each type.		4	Dec 2017
4	Explain the use of adapter design pattern with example.		6	Dec 2017
5	Apply strategy desgin pattern to the following and draw the class diagram. A company has many employees. Each employee has a name and a performance index in the range of 1 to 5. When the index is 2 the increment is 10 percent of the previous year salary, 3 the increment is 15 percent of the previous year salary, 4 the increment is 20 percent of the previous year salary and when it is 5 the increment is 25 percent of the previous year salary. Indicate the roll of each class in the class diagram.		8	Dec 2017
6	Weather station suppleies information about the temperature, pressure and humidity to three display devices named Statistics display, Graph dispay and Forecast display. Draw the class diagram of the system with appropriate design pattern. Write		8	Dec 2017

	clearly the role of each class in the class diagram.			
7	What is design pattern? Explain 4 essential elemnts of patterns.		8	May 2017
8	Explain the design pattern documentation.		8	May 2017
9	Write a short note on i) Observer design pattern. ii) State design patten.		8	May 2017
10	Write the classification, motivation, class diagram and uses of adapter design patten.		8	May 2017
11	Write the classification, motivation, class diagram and uses of adapter design patten.		8	Dec 2016, May 2016
12	Write the classification, motivation, class diagram and uses of observer design patten.		8	Dec 2016, May 2016
13	Write the classification, motivation, class diagram and uses of strategy design patten.		8	Dec 2016, May 2016
14	Write the classification, motivation, class diagram and uses of state design patten.		8	Dec 2016, May 2016
15	Define a design pattern. What is the basis on which the design patterns are classified? Name the types of design pattern with one example of each type.		8	Dec2015
16	Write the complete documentation of adapter design pattern.		8	Dec2015
17	For the description given below, draw the class diagram and identify the roles for a state design pattern. Mention the roles identified for each class and its relevent behaviour in the class diagram. When a book has isbn number, price, title and one or more authors. When it is bought in the library it gets' purchased state, When it is added to a catalogue it goes to 'catelogued' state. When the cataloguing is complete it goes to 'Available on stack' state. When it is borrowed by a member it goes to 'borrowed'		8	Dec2015

	state. When it is returned by a member it goes to 'available on stack' state.			
18	For the description given below, draw the class diagram and identify the roles for a stategy design pattern. Mention the roles identified for each class and its relevent behaviour in the class diagram. Grand health club offers a scheme for membership of the health club. The options available for registering are 'yoga' and 'aerobics'. the monthly charges for aerobics membership are 2000.00. The monthly charges for yoga membership are 1000.00. The members can avil a single option out of the two options. If a person books for three months, he gets 20% discount. If he books for six month, he gets 25 percent discount. If he books for nine months, he gets 35% discount. If he books for one year, he gets 50% discount.		8	Dec2015
19	Explain the design principles in GRASP.		12	
20	Write a short note on with diagram i) High Cohesion ii) Low Coupling iii) Polymorphism iv) Information Expert v) Creator vi) Pure Fabrication vii)Controller viii) Indirection ix) Protected Variations		18	
21	What is the Difference between GOF and GRASP design patterns		4	
22	Difference between Pure fabrication and Indirection		2	
23	Explain the notion of a design pattern, and why design patterns are important in object-oriented software development.		4	
24	Suggest how two other GoF design patterns might		2	

	be used in implementing the Take Exam use case.			
25	Briefly explain the role of GRASP patterns in object-oriented software development.		3	
26	Explain the GRASP principles of Polymorphism and Protected Variations, and how they are related, using examples from the exam software.		6	
27	Briefly explain the GRASP principle of Indirection, and how it relates to Polymorphism and Protected Variations		3	
28	We have a tool, implemented as a Java applet, which monitors exams in progress by accessing information from the server every few seconds. It contains a table with a row for each student, showing the status of the student, for instance how much time they have left, and when their work was last backed up. The invigilator has various display options, such as showing only student currently working, or ordering the table based on any of the columns. Explain the notion of a Controller, and the different types of controller, using the monitoring tool as an example. Suggest what sort of controller, if any, would be most appropriate here.		5	
29	How might other GRASP patterns be applied in the design of the monitoring tool?		3	
30	Write a short note on singleton design pattern		4	
31	Write a short note on adapter design pattern		4	
32	What is GOF design pattern? Explain		4	
33	what are design patterns, why do we need them give an example design pattern?		5	
34	Give sample implementation of singleton pattern in C++ or JAVA.		8	
35	Draw a sequence diagram to explain working of an observer pattern.		5	
36	What is design pattern and how is it documented,		5	

	give examples.			
37	Give intent, application, advantage of following patterns: i)Adaptor Pattern ii)Singleton Pattern iii) Strategy Pattern		10	
38	Define design patterns, discuss the characteristics of design pattern.		8	

Unit VI (Architectural Design)

Sr. No.	Question	CO No.	Marks	University Year
1	Draw diagrams for 4+1 View Architecture. Give a definition for software Architecture and explain the definition.	C414455.6	6	
2	write short notes on analyzing and evaluating software architecture?		5	
3	Define and explain with examples the term software architecture?		5	
4	Comment on statement that every computing system with software has a Software architecture.		5	
5	Explain how an Architect (Civil) makes an impact for building houses in terms of quality of houses/ buildings built.		5	
6	Why is software architecture important? Elaborate on how software architecture Inhibits or enables systems quality attributes, help build systems using large, externally developed elements.		5	
7	Architecture documentation also involves use of Deployment diagrams to show some architecture decisions especially related to performance, fault tolerance, explain with simple examples.		5	
8	Explain 7 part document structure?		5	
9	What is a deployment diagram. What kind of architectural decisions/ scenarios does a deployment diagram depict? Show the following two tier web application scenario using a deployment diagram. Scenario: Browser based client using HTTP to access static web pages.		6	
10	Consider Civil Engineering/ Architects profession of designing		6	

	and constructing residential/ office buildings. What is the difference between the role of architect and civil engineer. Similarly a software architect also helps build software with quality like security, performance etc. what is the difference between roles played by programmer and an architect. Explain with examples how software architect and architecture contributes to any software System's quality.			
11	Explain the concept of Robust Software Architecture? Specify software architecture requirements.		8	
12	Discuss the Architectural structure and views? What makes a good architecture?		8	
13	Explain views of software architecture.		6	
14	Why, applying software architectural patterns are important while designing s/w architecture.		4	
15	Explain Architectural Communication Patterns		6	
16	Write a short note on Interface design		3	
17	Explain Documenting s/w architectural Patterns		4	
18	List the layers of abstraction Architectural Pattern		4	
19	Write a note on S/w Architecture & Component-Based s/w architecture.		6	
20	Explain Client server architecture in detail.		8	
21	Explain Architectural Communication patterns for client server architecture.		6	
22	What is Database Wrapper class.		2	
23	What type of design decisions to use between client & service subsystem.		4	
24	Design principles for services Explain.		6	
25	Explain s/w architectural broker patterns.		4	
26	Which type of technology support for service-oriented architecture.		4	
27	Explain s/w architectural transition patterns		8	
28	Two phase commit protocol pattern		4	
29	Write a note on negotiation pattern		4	
30	How to design services & How to reuse services.		4	
31	Describe s/w oriented architecture for online shopping system.		6	
32	Write a steps in designing a component-based s/w architecture for a distributed application.		8	
33	Write a note on component subsystem.		4	
34	Describe application deployment issues.		6	
35	Explain the concept of real time system		4	

36	Explain the control patterns for real-time s/w architecture.		4	

ADDITIONAL RESOURCES

1. NPTEL course: Object Oriented Modeling
2. https://dzone.com/articles/solid-grasp-and-other-basic-principles-of-object-o
3. https://study.com/academy/lesson/grasp-design-patterns-in-object-oriented-design.html
4. https://www.tutorialspoint.com/object_oriented_analysis_design/index.htm

414456E Business Analytics & Intelligence

SYLLABUS

Teaching Scheme: TH:03 Hours/Week	Credits: 03	Examination Scheme: In-Sem (Paper): 30 Marks End-Sem (paper): 70 Marks

Prerequisites:

1. Fundamentals of Database Management System
2. Fundamentals of Discrete Mathematics

Course Objectives:

1. Apply conceptual knowledge on how business intelligence is used within organizations.
2. Evaluate organization's abilities to create and mobilize corporate knowledge.
3. Select software tools for knowledge management systems in business organizations
4. Suggest design systems to provide business intelligence

Course Outcomes:

By the end of the course, students should be able to

1. Comprehend the Information Systems and development approaches of Intelligent Systems
2. Evaluate and rethink business processes using information systems
3. Propose the Framework for business intelligence
4. Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence
5. Align business intelligence with business strategy
6. Apply the techniques for implementing business intelligence systems

Unit I	Decision Making and Decision Support Systems	7 Hrs

The role of computerized support for decision making and its importance. Types of decisions managers face, and the process through which they make decisions. Decision making styles, the four stages of Simon's decision making process, and common strategies and approaches of decision makers. The role of Decision Support Systems (DSS), its main components, the various DSS types and classification, and how DSS have changed over time. How DSS

supports each phase of decision making and summarize the evolution of DSS applications, and on how they
have changed over time.

Unit II	Business Intelligence Concepts and Platform Capabilities	7 Hrs

Definition of business intelligence (BI), BI architecture, and its components, and relation with DSS. The main components of BI platforms, their capabilities, and the competitive landscape of BI platforms. The building blocks of business reports, the types of business reports, and the components and structure of business reporting systems. Role of Mathematical model in BI, Factors Responsible for successful BI Project, Obstacle to Business Intelligence in an Organization Different types of OLAP and their applications, and the differences between OLAP and OLTP.

Unit III	Data Visualization and Dashboard Design	7 Hrs

The top job responsibilities of BI analysts by focusing on creating data visualizations and dashboards. The importance of data visualization and different types of data that can be visually represented. The types of basic and composite charts. This will help you to determine which visualization is most effective to display data for a given data set, and to identify best practices for designing data visualizations. Common characteristics of dashboard, the types of dashboards, and the list attributes of metrics usually included in dashboards. The guidelines for designing dashboard
and the common pitfalls of dashboard design.

Unit IV	Business Performance Management Systems	7 Hrs

This module focuses on how BI is used for Business Performance Management (BPM). The main components of BPM as well as the four phases of BPM cycle and how organizations typically deploy BPM. The purpose of Performance Measurement System and how organizations need to define the key performance indicators (KPIs) for their performance management system. Four balanced scorecards perspectives and the differences between dashboards and scorecards. The benefits of using balanced scorecard versus using Six Sigma in a performance measurement

system.

Unit V	Role of Business Intelligence and Analytics in Business	7 Hrs

The role of visual and business analytics (BA) in BI and how various forms of BA are supported in practice. ERP and Business Intelligence, BI Applications in CRM, BI Applications in Marketing, BI Applications in Logistics and Production, Role of BI in Finance, BI Applications in Banking, BI Applications in Telecommunications, BI Applications in Fraud Detection, BI Applications in Retail
Industry

Unit VI	BI Maturity, Strategy and Modern Trends in BI	7 Hrs

BI maturity and strategy. Different levels of BI maturity, the factors that impact BI maturity within an organization, and the main challenges and the potential solutions for a pervasive BI maturity within an organization. The critical success factors for implementing a BI strategy, BI framework, and BI implementation targets. Open Source BI. Big Data systems. Social BI systems, Geographic BI systems. Customer Experience based BI.

Text Books

1. Sabherwal, R. and Becerra-Fernandez, I. (2011). Business Intelligence: Practices, Technologies and Management. John Wiley.

2. Turban,E. and Volonino, L.(2011). Information Technology for Managment: Improving
Strategic and Operational Performance. 8th edn.Wiley.

Reference Books

1. Avison, D. and Fitzgerald, G. (2006). Information Systems development: Methodologies, techniques and tools. 4th ed. McGraw-Hill.

2. Anderson-Lehman, R., Watson, H.J., Wixom, B.H., & Hoffer, J.A., 2004, Continental Airlines Flies High with Real-Time Business Intelligence, MIS

Quarterly Executive, 3, 4, pp 163-176

3. Gangadharan, G.R., & Swami, N., 2004, Business Intelligence Systems: Design and

Implementation Strategies, Proceedings of the 2nd International conference on Technology Interfaces, June 7-10, Cavtat, Croatia, pp 139-144

COURSE OUTCOMES

Upon successful completion of the course, the students should be able to: **references**

CO No.	Course Outcome	Mapping With Unit	Assessment Technique	Blooms Taxonomy Category
C414456E.1	Comprehend the Information Systems and development approaches of Intelligent Systems.	I	Pre In Sem Mock Test- I	Understanding
C414456E.2	Evaluate and rethink business processes using information systems.	IV		Evaluating
C414456E.3	Propose the Framework for business intelligence.	III		Creating
C414456E.4	Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.	II	Pre End Sem Mock Test-II	Understanding
C414456E.5	Align business intelligence with business strategy.	VI		Remembering
C414456E.6	Apply the techniques for implementing business intelligence systems.	V		Applying

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PREREQUISITES

Sr. No.	Unit Number	Prerequisite subject name
1.		nentals of Database Management System
2.	II	Fundamentals of Database Management System & Fundamentals of Discrete Mathematics
3.	III	Fundamentals of Database Management System & Fundamentals of Discrete Mathematics
4.	IV	Fundamentals of Database Management System & Fundamentals of Discrete Mathematics
5.	V	Fundamentals of Database Management System
6.	VI	Fundamentals of Database Management System

TEACHING PLAN

Teaching Plan Short

Academic Year:-2020-21 Semester : I w. e. f. :-5th July 2021

Class : - BE Division:A & B

Subject :- **Business Analytics & Intelligence**

Subject Code :- 414456E

Faculty In charge :-Mrs.Y.D.Fatangare/Mrs. Ashwini Bhamre No. of Lectures/ weeks: 03

- **Lecture Plan**

Sr. No.	Unit No.	Unit/ Topic Name	Start Date	End Date
1.	I	Decision Making and Decision Support Systems	1st Week July	2nd Week July
2.	II	Business Intelligence Concepts and Platform Capabilities	3rd Week July	4th Week July
3.	III	Data Visualization and Dashboard Design	1st Week August	2nd Week August
4.	IV	Business Performance Management Systems	3rd Week August	4th Week August
5.	V	Role of Business Intelligence and Analytics in Business	1st Week Sept	2nd Week Sept
6	VI	BI Maturity, Strategy and	3rd Week	4th Week

.		Modern Trends in BI	Sept	Sept

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Detail Teaching Plan

Lect .No	Unit No.	Main Topic to be Covered	Sub Topics to be Covered	Reference Books	CO to Attain	Measurable to attain CO	Mode of Delivery
1	I	**Decisio**	Background of BI	1. https:// www.coursera.org/lecture/ busin ess-intelligence-tools/conceptual- foundations-of- decision-making- video-lecture- oEAG6, 2. Data Mining and Business Intelligence By S.K. Shinde and Uddgiri Chandrasekhar 3.Business Intelligence:	C414456E.1	Class Test- 1, University	Google Meet,Google classroom,PPT's Youtube Videos
2			The role of computerized support for decision making and its importance.				
3			Types of decisions managers face, and the process through which they make decisions.				
4			Decision making styles, the four stages of Simon's decision making process,				

	n Making and		Data Mining and Optimization for Decision Making Carlo Vercellis	Exam,	
5	**Decision Support Systems**	common strategies and approaches of decision makers.The role of Decision Support Systems (DSS), its main components,			
6		The various DSS types and classification, and how DSS have changed over time			
7		How DSS supports each phase of decision making and summarize the evolution of DSS applications, and on how they have changed over time.			
8	Business	Definition of business intelligence (BI), BI architecture, and its components, and relation with DSS.			

	II	Intelligence Concepts and Platform Capabilities			C414456 E.4	Class Test-1, University Exam,	Google Meet,Google classroom,PPT's Youtube Videos
9			The main components of BI platforms, their capabilities, and the competitive landscape of BI platforms.				
10			The building blocks of business reports, the types of business reports,				

11			and the components and structure of business reporting systems				
12			Role of Mathematical model in BI,				
13			Factors Responsible for successful BI Project, Obstacle to Business Intelligence in an Organization				
14			Different types of OLAP and their applications, and the differences between OLAP and OLTP.				
15	III	Data Visualization and Dashboard Design	The top job responsibilities of BI analysts by focusing on creating data visualizations and dashboards.		C414456 E.3		

16		The importance of data visualization and different types of data that can be visually represented.			
17		The types of basic and composite charts. This will help you to determine which visualization is most effective to display data for a given data set,			
		and to identify best practices for designing data visualizations		University Exam, Class Test-I	Google Meet,Google classroom,PPT's Youtube Videos
18		Common characteristics of dashboard, the types of dashboards,			
19		and the list attributes of metrics usually included in dashboards.			

20			The guidelines for designing dashboard and the common pitfalls of dashboard design.				
21	**Assessment Technique – Class Test-I**						
22	**IV**	**Business Performance Management Systems**:	The main components of BPM as well as the four phases of BPM cycle.	https:// www.coursera.org/lecture/business-intelligence-tools/business-performance-management-video- lecture-t11O5	C414456E.2	Class Test-2,University Exam	
23			and how organizations typically deploy BPM.				
24			The purpose of Performance Measurement System and how organizations need to define the key performance indicators (KPIs) for their performance management system.				
25			Four balanced scorecards perspectives				
			and the differences between dashboards and scorecards.				
26			The benefits of using balanced scorecard versus using Six Sigma in a performance				

			measurement system.				
27	**V**	**Role of Business**	The role of visual and business analytics (BA) in BI and how various	Data Mining and Business			
		Intelligence and Analytics in Business	forms of BA are supported in practice.	Intelligence By S.K. Shinde and Uddgiri Chandrasekhar	C414456E.6	,Class Test-2,University Exam	Google Meet,Google classroom,PPT's Youtube Videos
28			ERP and Business Intelligence,				
29			BI Applications in CRM, BI Applications in Marketing,				
30			BI Applications in Logistics and Production, Role of BI in Finance,				
31			BI Applications in Banking, BI Applications in Telecommunications,				
32			BI Applications in Fraud Detection, BI Applications in Retail Industry				
3			BI maturity and strategy. Different				Google Meet,Goo

3	**VI**	**BI Maturity, Strategy and Modern Trends in BI**	levels of BI maturity,	https:// www.coursera.org/lecture/business-intelligence-tools/bi-strategy-video-lecture-cwKiZ	C414456E.5	Class Test-2,University Exam	gle classroom,PPT's Youtube Videos
34			the factors that impact BI maturity within an organization,				
35			and the main challenges and the potential solutions for a pervasive BI maturity within an organization.				
36			The critical success factors for implementing a BI strategy, BI framework, and BI implementation targets.				
37			Open Source BI. Big Data systems.				

38			Social BI systems, Geographic BI systems.				
39			Customer Experience based BI.				
40	**Assessment Technique – Class Test-II**						

UNITWISE QUESTION BANK

UNIT I : DECISION MAKING AND DECISION SUPPORT SYSTEMS

Sr No.	Question	CO	Marks	University
1	Define DSS? What is need of computerized DSS.	C414456E.1	4	
2	Explain different decision making styles.	C414456E.1	4	
3	List out the four steps managers take in making a decision.	C414456E.1	4	
4	Explain architecture of DSS.	C414456E.1	4	
5	What are structured, unstructured and semi-structured decisions? Provide two examples of each.	C414456E.1	6	
6	List and briefly describe Simon's four phases of decision making.	C414456E.1	4	
7	How can a DSS support the implementation of a decision?	C414456E.1	4	
8	Differentiate between Operational systems and DSS.	C414456E.1	4	
9	Explain different components of DSS.	C414456E.1	6	
10	Explain decision making process in detail.	C414456E.1	5	
11	What are different types of decisions. Explain with example.	C414456E.1	6	
12	List and explain various types of DSS	C414456E.1	6	
12	Define rational decision making. What does it really mean to be a rational decision maker?	C414456E.1	4	

13	Define scenario. How is a scenario used in decision making?	C414456E.1	4	
14	Explain decision support system with its limitations	C414456E.1	5	May 2017
15	Explain any one application of decision support system in detail.	C414456E.1	5	May 2017
16	What are the various types of decisions? Explain the process through which the decisions are done by Managers.	C414456E.1	6	May 2019
17	Explain the four stages of simons decision making process	C414456E.1	4	May 2019
18	Describe the approaches of decision makers.	C414456E.1	4	May 2019

UNIT II : Business Intelligence Concepts and Platform Capabilities

Sr No.	Question	CO	Marks	University
1	Compare & contrast OLTP and OLAP.	C414456E.4	4	Insem,Oct 2016
2	Explain the role of data warehouse in Business intelligence.	C414456E.4	6/3	Insem,Oct 2016,Insem 2017-18
3	Explain BI with different types of Business Models.	C414456E.4	4	
4	Explain System Components of BI.	C414456E.4	6	
5	Write in detail about Business Intelligence System Components.	C414456E.4	6	
6	Explain the concepts of Data, Information, Knowledge with the help of suitable example.	C414456E.4	4	
7	Define BI. List and describe the major components of BI.	C414456E.4	6	
8	Explain the relationship between BI and Data Warehouse.	C414456E.4	6	
9	Explain the importance of security while creating Business Intelligence Reports. Explain different types of securities in reporting.	C414456E.4	6/8	Dec 2016
10	Describe reporting architecture. What are the	C414456E.4	8	

	features of Ad-hoc reporting?			
11	Write a short note on OLAP.	C414456E.4	4	
12	Define BI. List at least four BI tools.	C414456E.4	4	End sem 2017-18
12	Explain with an example of different security levels in BI reports.	C414456E.4	8	End sem 2017-18
13	List and explain at least two BI applications.	C414456E.4	4	In sem 2017-18
14	Define BI. List and describe the major components of BI.	C414456E.4	6	In sem 2017-18
15	Define OLTP and OLAP. Explain its importance in Relational Database.	C414456E.4	4	In sem 2017-18
16	List types of OLAP Servers. Explain any two OLAP Servers with its architecture.	C414456E.4	8	
17	What are the factors responsible for successful BI project	C414456E.4	5	May 2017
18	Explain Business Intelligence cycle with suitable diagram	C414456E.4	5	May2017
19	Explain HOLAP and DOLAP in detail	C414456E.4	6	May 2017
20	Write a short note on any two of the following (any 2) i.Dashboard as reporting tool ii.Ad-hoc reporting iii.OLAP servers	C414456E.4	8	May 2016
21	What are the obstacles in business intelligence systems.	C414456E.4	5	
2	Explain the role of business intelligence in	C414456E.	5	

2	making business successful	4		
23	What are different factors responsible for successful BI project, briefly explain.	C414456E.4	4	May 2019
24	Explain 5 different stages of business intelligence. Also discuss functionality and objective of each stage	C414456E.4	6	May 2019

UNIT III :Data Visualization and Dashboard design

Sr No.	Question	CO	Marks	University
1	Explain different data visualization techniques. Describe the features of Tableau.	C414456E.3	9	
2	Define Dashboard. Which softwares are used in Dashboard creation? Create and explain one scenario for Dashboard presentation.	C414456E.3	8	End sem 2017-18
3	Explain different data visualization techniques. (at least 4)	C414456E.3	9	End sem
4	What is importance of data visualization?	C414456E.3	8	
5	Explain different types of data that can be visually represented.	C414456E.3	5	
6	What are the different types of basic and composite charts?	C414456E.3	5	
7	What is the need of composite chart in Business Intelligence?	C414456E.3	8	
8	How data visualization is important in Business Intelligence?	C414456E.3	8	

9	List out the steps to design data visualization.	C414456E.3	5	
10	List and explain characteristics of Dashboard.	C414456E.3	5	
11	What are the types of Datashboard?	C414456E.3	5	
12	List and explain attributes of metrics usually included in dashboards.	C414456E.3	8	
12	Explain dashboard design with any real time example.	C414456E.3	8	
13	Explain the guidelines and common pitfalls of dashboard design	C414456E.3	6	
14	Define data visualization and list its major advantages. List in brief different directions in data visualizations.	C414456E.2	8	May 2016
15	What are various types of reports.Explain Ad-hoc reporting in detail.	C414456E.2	8	Dec 2016
16	What are the types of Dashboards and list attributes of metrics usually included in dashboards.	C414456E.3	4	May 2019
17	Explain data visualization. Explain the job responsibilities of BI analysts for creating data visualizations.	C414456E.3	6	May 2019
18	What are various tools that are used in visualization of big data?	C414456E.3	4	May 2019

UNIT IV :Business Performance Management Systems

Sr No.	Question	CO	Marks

University

Sr No.	Question	
1	What is BPM (Business Performance Management System)?	C414456E.25
2	List and explain four phases of BPM cycle.	C414456E.25
3	How organizations typically deploy BPM?	C414456E.28
4	What is the purpose of Performance Measurement System?	C414456E.28
5	How organizations define the key performance indicators (KPIs) for their performance management system?	C414456E.28
6	What are differences between dashboards and scorecards?	C414456E.28

	CO	Marks	University
1	Explain the similarities and dissimilarities between Business intelligence and Business Analytics.	C414456E.6	8
			End Sem
2	Explain Business Analytics with suitable example?	C414456E.6	6
3	Explain role of visual and business analytics (BA) in BI.	C414456E.6	8
4	What is CRM?	C414456E.6	5
5	How business intelligence is applied in CRM.	C414456E.6	6

	6	Explain BI Applications in Marketing and in Logistics and Production.	C414456E.6 8
	7	Explain application of BI in Finance	C414456E.6 8
	8	Explain application of BI in Banking	C414456E.6 8
	9	List various Applications of BI. Explain any one in detail.	C414456E.6 6
	10	Explain application of BI in Retail Industry	C414456E.6 8
	11	Write a short note on BI application tools. Explain Qlikview with its technical Features.	

C414456E.6

8

End sem

12

Explain the need and role of BI in improving various business functionalities.

C414456E.6

6

13

Write a short note on CRM.

C414456E.6

6

14

Explain application of BI in Fraud Detection

C414456E.6

15

Design a BI system for fraud detection by describing all the steps from Data Collection to Decision Making.

C414456E.6

10

16

Explain in detail role of Business intelligence in Finance sector.

C414456E.6

8

May 2019

17

What are the various domains where BI can be used and explain any four BI applications in detail withan example.

C414456E.6

8

May 2019

18

How various forms of BA are supported in practice? Briefly explain?

C414456E.6

8

May 2019

19

List and explain the different ways Business Intelligence Software can help in improving sales and marketing process.

C414456E.6

8

May 2019

UNIT VI : BI Maturity, Strategy and Modern Trends in BI

Sr No.	Question	CO	Marks	University
1	Explain BI maturity and Strategy.	C414456E.5	8	
2	State Different levels of BI maturity.	C414456E.5	8	
3	What are the factors that impact BI maturity within an organization	C414456E.5	8	
4	Explain Open Source BI in detail.	C414456E.5	8	
5	Write a short note on Big data Systems .	C414456E.5	5	
6	List and explain four elements of Big data system.	C414456E.5	5	
7	Explain Customer Experience based BI with any real time example.	C414456E.5	8	
8	What is the difference between Social BI and Geographic BI system?	C414456E.5	5	
9	Explain BI Framework in detail.	C414456E.5	8	
10	Explain the main challenges and the potential solutions for a pervasive BI maturity within an organization	C414456E.5	8	
11	What is Big data? What are the challenges handling them? Explain how PIG and HIVE are used to deal with Big data.	C414456E.5	9	
12	What is Big Data? List the characteristics of Big Data. Draw and explain the architecture of HIVE .	C414456E.5	9	End Sem
12	What are the different types of BI? Explain Social BI and Geographic BI in detail.(10M,	C414456E.5	10	End sem 2017-18
13	Write a short note on any 3 of the following A) Open source BI	C414456E.5	18	

	B) Social BI C) Geographic BI			
14	Explain main challenges and the potential solutions for the pervasive BI maturity	C414456E.5	8	May 2019
15	What is Big Data systems? Explain its applications in Education, Manufacturing, Media and Internet of Things	C414456E.5	8	May 2019
16	Explain with an example ,How customer experience will help in building an effective BI system.	C414456E.5	8	May 2019
17	Write a short note on any 3 of the following B) Open source BI B) Social BI C) Geographic BI	C414456E.5	10	May 2019

Home Assignment

UNIT I : DECISION MAKING AND DECISION SUPPORT SYSTEMS

Sr No.	Question	CO	Marks	University
1	Define DSS? What is need of computerized DSS.	C414456E.1	4	
2	Explain Simon's four phases of decision making.	C414456E.1	4	
3	Explain different types of decisions with example.	C414456E.1	6	
4	Differentiate between Operational systems and DSS	C414456E.1	4	

UNIT II : Business Intelligence Concepts and Platform Capabilities

Sr No.	Question	CO	Marks	University
1	Compare & contrast OLTP and OLAP.	C414456E.4	4	Insem,Oct 2016
2	Explain BI terminology. List and describe the major components of BI.	C414456E.4	6	In sem 2017-18
3	Define OLTP and OLAP. Explain its importance in Relational Database.	C414456E.4	4	In sem 2017-18
4	Explain with an example of different security levels in BI reports.	C414456E.4	6	End sem 2017-18
5		C414456E.4		

UNIT III :Data Visualization and Dashboard design

Sr No.	Question	CO	Marks	University
1	Define Dashboard. Which softwares are used in Dashboard creation? Create and explain one scenario for Dashboard presentation.	C414456E.3	8	End sem 2017-18
2	Discuss how data visualization is important in Business Intelligence?	C414456E.3	4	

3	Elaborate different data visualization techniques. (at least 4)	C414456E.3	9	End Sem
4	Discuss and list characteristics of Dashboard.	C414456E.3	8	
5	Define data visualization and list its major advantages. List in brief different directions in data visualizations.	C414456E.3	8	May 2016

UNIT IV :Business Performance Management Systems

Sr No.	Question	CO	Marks	University
1	List and explain four phases of BPM cycle.	C414456E.2	6	
2	Compare balanced scorecard and Six Sigma.	C414456E.2	4	
3	Explain how organizations define the key performance indicators (KPIs) for their performance management system.	C414456E.2	8	
4	Explain BPM with any real time example.	C414456E.2	4	

UNIT V : Business Performance Management Systems

Sr No.	Question	CO	Marks	University
1	Identify and explain the similarities and dissimilarities between Business intelligence and Business Analytics.	C414456E.6	8	End Sem
2	How to make use of BI in Banking.	C414456E.6	8	
3	Build(design) a BI system for fraud detection by describing all the steps from Data Collection to Decision Making.	C414456E.6		

4	How to make use of BI in CRM.	C414456E.6		
5	Write a short note on BI application tools. Explain Qlikview with its technical Features.	C414456E.6	8	End sem

UNIT VI : BI Maturity, Strategy and Modern Trends in BI

Sr No.	Question	CO	Marks	University
1	What is Big Data? List the characteristics of Big Data. Draw and explain the architecture of HIVE .	C414456E.5	9	End Sem
2	Explain BI Framework in detail.	C414456E.5	8	
3	What are the different types of BI? Explain Social BI and Geographic BI in detail.	C414456E.5	10	End sem 2017-18

Additional Resources

Nil

414457_

Software Testing and Quality Assurance

SYLLABUS

Teaching Scheme:
TH:03 Hours/ Week

Examination Scheme:

In-Sem (Paper): 30 Marks End-Sem (paper): 70 Marks

Prerequisites:

1. Software Engineering.

Course Objectives:

1. Learn to apply the testing strategies and methodologies in projects.
2. To understand test management strategies and tools for testing.
3. A keen awareness on the open problems in software testing and maintenance.
4. To explain quality assurance and various tools used in quality management.
5. To learn in detail about various quality assurance models.
6. To understand the audit and assessment procedures to achieve quality.

Course Outcomes:

By the end of the course, students should be able to

1. Test the software by applying testing techniques to deliver a product free from bugs.
2. Investigate the scenario and to select the proper testing technique.
3. Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
4. Understand how to detect, classify, prevent and remove defects.
5. Choose appropriate quality assurance models and develop quality.
6. Ability to conduct formal inspections, record and evaluate results of inspections.

Unit I SOFTWARE TESTING BASICS **7 Hrs**

Testing as an engineering activity, Role of process in software quality, Testing as a

process, Basic definitions, Software testing principles, The tester's role in a software development organization, Origins of defects, Defect classes, The defect repository and test design, Defect examples, Developer / Tester support for developing a defect repository.

Unit II TESTING TECHNIQUES AND LEVELS OF TESTING

7 Hrs

Using White Box Approach to Test design - Static Testing Vs. Structural Testing, Code Functional

Testing, Coverage and Control Flow Graphs, Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing, Decision tables, State-based testing, Cause-effect graphing, Error guessing, Compatibility testing, Levels of Testing -Unit Testing, Integration Testing, Defect Bash Elimination. System Testing - Usability and Accessibility Testing, Configuration Testing, Compatibility Testing.

Unit III SOFTWARE TEST AUTOMATION AND QUALITY METRICS

Software Test Automation, Skills needed for Automation, Scope of Automation, Design and Architecture for Automation, Requirements for a Test Tool, Challenges in Automation Tracking the Bug, Debugging. Testing Software System Security - Six-Sigma, TQM - Complexity Metrics and Models, Quality Management Metrics, Availability Metrics, Defect Removal Effectiveness, FMEA, Quality Function Deployment, Taguchi Quality Loss Function, Cost of Quality.

Unit IV FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE

SQA basics, Components of the Software Quality Assurance System, software quality in business context, planning for softw

are quality assurance, product quality and process quality, software process models, 7 QC Tools and Modern Tools.

Unit V QUALITY ASSURANCE MODELS 7 Hrs

Models for Quality Assurance, ISO-9000 series, CMM, CMMI, Test Maturity Models, SPICE, Malcolm Baldrige Model- P-CMM.

Unit VI SOFTWARE QUALITY ASSURANCE TRENDS 7 Hrs

Software Process- PSP and TSP, OO Methodology, Clean-room software engineering, Defect Injection and prevention, Internal Auditing and Assessments, Inspections & Walkthroughs, Case Tools and their Affect on Software Quality.

Text Books

1. Srinivasan Desikan, Gopalaswamy Ramesh,Software Testing:
Principles and Practices Pearson.
2. Daniel Galin, Software Quality Assurance: From Theory to
Implementation, Pearson Addison Wesley.

Reference Books

1. Aditya P. Mathur, Foundations of Software Testing, Pearson.
2. Paul Ammann, Jeff Offutt, Introduction to Software Testing, Cambridge University Press.
3. Paul C. Jorgensen, Software Testing: A Craftsman's Approach, Auerbach Publications.
4. William Perry, Effective Methods of Software Testing, Wiley Publishing, Third Edition.
5. Renu Rajani, Pradeep Oak, Software Testing – Effective Methods, Tools
and Techniques, Tata McGraw Hill.
6. Stephen Kan, Metrics and Models in Software Quality, Addison – Wesley, Second Edition.
7. S.A.Kelkar, Software quality and Testing, PHI Learing, Pvt, Ltd.
8. Watts S Humphrey, Managing the Software Process ,Pearson Education Inc.

COURSE OUTCOMES

CO No.	Course Outcome	Mapping With Unit	Assessment Technique	Blooms Taxonomy Category
414457C.1	Test the software by applying testing techniques to deliver a product free from bugs.	Unit I	Home Assignment/ Pre In sem Test	III. Applying
414457C.2	Investigate the scenario and to select the proper testing technique.	Unit II	Home Assignment/ Pre In sem Test	IV. Analyzing
414457C.3	Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.	Unit III	Home Assignment/ Pre In sem Test	V. Evaluating
414457C.4	Understand how to detect, classify, prevent and remove defects.	Unit IV	Home Assignment/ Pre End sem Test	II. Understanding
414457C.5	Choose appropriate quality assurance models and develop quality.	Unit V	Home Assignment/ Pre End sem Test	II. Understanding
414457C.6	Ability to conduct formal inspections, record and evaluate results of inspections.	Unit VI	Home Assignment/ Pre End sem Test	V. Evaluating

PREREQUISITES

Sr. No.	Unit Number	Prerequisite subject name
1	I	Software Engineering
2	II	Software Engineering
3	III	Software Engineering Metric system
4	IV	Software Engineering
5	V	Software Engineering
6	VI	Software Engineering OOPS Concept

TEACHING PLAN

Academic Year:-2021-22	Semester:-I	w. e. f. :- 01/07/2021
Class : - BE IT		Division:A & B
Subject :- SOFTWARE TESTING AND QUALITY ASSURANCE		Subject Code :- 414457C
Faculty In charge :- Prof. D.A.Patil Prof. V. S. Kamble		No. of Lectures/ weeks: 3

- **Lecture Plan**

Sr. No.	Unit No.	Unit/ Topic Name	Start Date	End Date
1.	I	SOFTWARE TESTING BASICS	July 1st week	July 3rd week
2.	II	TESTING TECHNIQUES AND LEVELS OF TESTING	July 4th week	Augest 2nd week
3.	III	SOFTWARE TEST AUTOMATION AND QUALITY METRICS	August3rd week	August 4th week
4.	IV	FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE	August 4th week	September 1st week
5.	V	QUALITY ASSURANCE MODELS	September 1st week	September 2nd

				week
6.	VI	SOFTWARE QUALITY ASSURANCE TRENDS	September 3rd 3rd week	September 3rd week

Detail Teaching Plan

Lect. No	Unit No.	Main Topic to be Covered	Sub Topics to be Covered	Chap. No. & Reference Books	CO to Attain	Measurable to attain CO	Mode of Delivery
1.	I	**SOFTWARE TESTING BASICS**	Testing as an engineering activity, Role of process in software quality	Ch 1 & 2 T1, tutorial points	414457 C .1	Home assignment/ Test	PPT, Google classroom,
2.			Testing as a process, Basic definitions, Software testing principles				
3.			The tester's role in a software development organization				
4.			Origins of defects, Defect classes, The defect repository and test design				
5.			Defect Life cycle				
6.			Developer / Tester support for developing a defect repository. Defect examples test design				
7.			Using White Box Approach to Test design	Ch 3 T1			

8.	II	**TESTING TECHNIQUES AND LEVELS OF TESTING**	Static Testing Vs. Structural Testing, Code Functional Testing, Coverage and Control Flow Graphs	GreekFork	414457 C .2	Home assignment/ Test	PPT, Video Google classroom
9.			Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing	Ch 4 T1			
10.			Decision tables, State-based testing, Cause-effect graphing, Error guessing,				
			Compatibility testing, Levels of Testing				
11.			**Unit Testing, Integration Testing, Defect Bash Elimination. System Testing**				
12.			**Usability and Accessibility Testing, Configuration Testing, Compatibility Testing**				
13.			**Software Test Automation, Skills needed for Automation, Scope of Automation,**				**PPT, Video, Google classroom**
			Design and Architecture for				

14.			**Automation, Requirements for a Test Tool,Challenges in Automation Tracking the Bug, Debugging**				
15.			**Testing Software System Security - Six-Sigma,**				
16.			**TQM - Complexity Metrics and Models, Quality Management Metrics, Availability Metrics,**				
17.			**Defect Removal Effectiveness, FMEA,**				
18.			**Quality Function Deployment, Taguchi Quality Loss Function, Cost of Quality.**				
19.			**SQA basics, Components of the Software Quality Assurance System,**				**PPT, Google classroom**
20.			**software quality in business context,**				
21.			**Planning for software quality assurance,**				

			Product quality and process quality,				
22.			**software process models,**				
23.			**7 QC Tools and Modern Tools.**				
24.			**Models for Quality Assurance, ISO-9000 series,**				**PPT, Google classroom**
25.			**CMM, CMMI**				
26.			**Test Maturity Models, SPICE,**				
27.			**Malcolm Baldrige Model- P-CMM.**				
28.			**Software Process- PSP and TSP, OO Methodology,**				**PPT, Google classroom**

29.			**Clean-room software engineering, Defect Injection and prevention,**				
30.							
31.			**Internal Auditing and Assessments, Inspections & Walkthroughs,**				
32.							
33.			**Case Tools and their Affect on Software Quality.**				
34.			**Case Tools and their Affect on Software Quality.**				

a) Text Books:

1. SrinivasanDesikan, Gopalaswamy Ramesh,Software Testing: Principles and Practices Pearson.
2. Daniel Galin, Software Quality Assurance: From Theory to Implementation, Pearson Addison Wesley.
3. Roger S. Pressman, Software engineering A Practitioner's Approach

HOME ASSIGNMENT

BE

UNIT NO. 1

Q. No.	Question	CO	Marks	University Year
1.	How you can apply concept of validation and verification in software testing using V model	414457C.1	8	
2.	Given the many challenges facing tester what types of skills do you believe should be required of a person being hired as test specialist.	414457C.1	5	
3.	Write down minimum 20 test cases on login form and specify respective phase of testing	414457C.1	10	
4.	What are the typical origins of defects? From your personal experiences what are the major resources of defect in the software artifacts that you have developed	414457C.1	6	

UNIT NO. 2

Q. No.	Question	CO	Marks	University Year
1.	Consider any web site/ application and check its quality by analyzing it. Apply software testing techniques and	414457C.2	20	

	prepare document for same. - Write down test cases at least 10 - Mansion which method of testing you are using - Specify type of testing - Who is going to perform that testing	414457C.2 414457C.2 414457C.2		

UNIT NO. 3

Q. No.	Question	CO	Marks	University Year
1.	What are the consequences if cylomatic complexity of system is greater than 10? As designer of system how will you handle this?	414457C.3	6	
2.	Can you list and explain parts of TQM Framework. How TQM is beneficial.	414457C.3	6	
3.	What fact you will use for Alstead metrics to calculate the size of matrices	414457C.3	6	
4.	What examples can you find to compare terms manual and automation testing	414457C.3	6	

UNIT NO. 4

Q. No.	Question	CO	Marks	University Year
5.	Explain 7 qc tools in details	414457C.4	8	May-June 2019
6.	Explain planning for software quality assurance w.r.t final year project	414457C.4	8	May-June 2019
7.	Relate how components of SQA system	414457C	8	May-June

	can be applied for your final year project	.4		2019
8.	Explain Product and process quality with an example	414457C .4	8	May-June 2019

UNIT NO. 5

Q. No.	Question	CO	Marks	University Year
2.	Explain malcom baldrige Model	414457C .5	8	May-June 2019
3.	Draw and explain CMMI levels	414457C	8	May-June
		.5		2019
4.	Write a short note on CMM, SPICE	414457C .5	8	May-June 2019
5.	Explain in details ISO 9000 Model for quality assurance	414457C .5	8	May-June 2019

UNIT NO. 6

Q. No.	Question	CO	Marks	University Year
5.	Write Short note on OO Mythology	414457C .6	5	May-June 2019
6.	Explain Clean room methodology in details along with diagram	414457C .6	8	May-June 2019
7.	Explain software project internal auditing and assessments	414457C .6	8	May-June 2019
8.	Consider online banking system sate and inject 5 defect in system which	414457C .6	10	May- June

	will cause flaw in the system and suggest its preventive measures			2019

UNIT WISE QUESTION BANK

Unit I:SOFTWARE TESTING BASICS				
Sr. No.	**Question**	**CO No.**	**Marks**	**University Year**
1	What is difference between testing and debugging (4 marks	I	6	
2	What are the differences between verification and validation? How does your organization handle each of these activities	I	6	
3	Given the many challenges facing tester what types of skills do you believe should be required of a person being hired as test specialist.	I	4	
4	what is the typical origins of defects? From your personal experiences what are the major resources of defect in the software artifacts that you have developed	I	2	
5	Explain defect repository in details	I	6	
6	What do you mean by coding defects	I	4	
7	Explain the role of developers/testers for defect repository	I	6	
8	What are the typical origins of defects? From your personal experiences what are the major resources of defect in the software artifacts that you have developed	I	6	

Unit II:TESTING TECHNIQUES AND LEVELS OF TESTING

Sr.	Questi	CO No.	Marks	Univ
1	What is test case? What is the test case design? (3 marks)	II	3	
2	Describe the difference between white box and black box testing	II	4	
3	.Write a short note on test cases design strategies using white box	II	6	
4	Explain accessibility testing	II	3	
5	What is importance of code inspection	II	6	
6	Explain merits and demerits function coverage.	II	4	
7	What is Explain merits and demerits of function coverage	II	4	
8	What is control flow graph? How is it used white box testing	II	6	
9	Write black box test cases for coffee maker machine	II	6	
10	Explain equivalence portioning with an example	II	5	
11	Define the concepts of boundary values	II	4	
12	Explain the differences between random testing and testing using	II	4	
13	What is requirement based testing? Explain with an example	II	6	
14	Explain cause effect diagram with an example	II	4	
15	Explain error guessing testing with an example	II	4	
16	What are the stub and drivers in unit testing	II	3	
17	Define sandwich testing	II	6	
18	Discuss the advantage and disadvantage of top down and bottom	II	4	
19	What is functional and non function testing	II	6	
20	Explain Usability testing	II	3	
21	Explain any techniques to perform usability testing	II		

Unit III: SOFTWARE TEST AUTOMATION AND QUALITY METRIC

Sr. No.	Question	CO No.	Marks	University Year
1	Q1. Write a short note on test execution and reporting	III	3	
2	Compare terns manual and automation testing	III	6	
3	Explain automation framework in brief	III	3	
4	Discuss generation automation	III	4	
5	Ilustrate scope of automation in detail	III	3	
6	Explain design and architecture in automation	III	6	
7	State various requirement for a test tool.	III	6	
8	List out challenges of automation testing	III	2	
9	Why debugging is important	III	3	
10	Discuss various types of debuggers	III	6	
11	Outline various methods of debugging in brief	III	6	
12	What are the different types of breakpoints	III	3	
13	Explain briefly the work bench for testing software system security	III	6	
14	Q14 Explain with example the six sigma measure of software quality	III	3	
15	Describe various six sigma mythologies	III	6	
16	What is DMAIC	III	3	
17	Explain total quality management	III	4	
18	Describe the key element of TQM	III	6	
19	Describe the important elements of TQM	III	3	

	System			
20	What is the TQM Framework	III	4	
21	List out key benefits of TQM	III	2	
22	What are the disadvantages of LOC metric	III	3	
23	What is the basis for Alstead metrics to calculate the size of matrices	III	6	
24	What are the consequences if cylomatic complexity of system is greater than 10? As designer of system how will you handle this?	III	6	
25	explain terms Availability Reliability MTTF MTTR MRBF	III	6	
26	Explain defect removal effectiveness	III	6	
27	List the activities related to defect injection and removal	III	6	
28	Explain the four types of FMEA	III	6	
29	What is QFD & explains four phase of QFD with benefits	III	6	
30	Discuss the terms house of quality	III	2	
31	Explain in detail Taguchi quality loss function with an Example	III	6	
32	What are the various quality cost areas with respect to COQ	III	6	

Unit IV:FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE

Sr. No.

Question

CO No.

Marks

University Year

1

Explain software quality in brief

IV

3

2

How quality is important in requirement analysis phase of DLC

IV

2

3

How quality is important in design phase of sdlc

IV

2

4

How quality is important in specification phase of SDLC

IV

2

5

How quality is important in coding of sdlc

IV

2

6

How the quality is important in testing of SDLC

IV

3

7

What are the objectives of software quality assurance

IV

3

8

What are the goals of software quality assurance
IV
5

9
Define SQA Plan
IV
5

10
Explain SQA Components in details
IV
5

11
Comment on product quality and process quality
IV
4

12
Briefly explain the ISO 9126 quality characteristic
IV
6

13
State some difficulties in applying the McCall and ISO 9126 quality models
IV
3

14
Explain the product quality models
IV
3

15
Compare McCall's quality with model with ISO 9126
IV
6

16
Discuss ISO 9001 Standards
IV
5

17
Describe different software development models
IV

6

18
Explain the basic the seven tools for software quality
IV
5

19
Write a note on following Ishikwas tools for quality
IV
6

20
Explain modern tools of software quality
IV
5

Unit:V
QUALITY ASSURANCE MODELS

Sr. No.	**Question**	**CO No.**	**Marks**	**University Year**
1	Give the shortcoming of ISO 900 certification (3 marks)	V	3	

2

Why is it important for a software development organization to obtain ISO9000

V

3

3

How does the ISO 9000 standard helps in producing a good quality software

V

6

4

Write in brief about ISO 9000

V

2

5

Outline the seven principal of quality management that forms basis of ISO

V

4

6

What is ISO standard? What are its advantages

V

4

7	Explain the details the SEI CMM Model	V	4
8	Write about the common feature of key practices in the cmm	V	4
9	What are the five maturity levels of CMM model	V	4
10	What is difference between CMM model and ISO standards	V	4

11	Write key process areas in CMMI model	V	4
12	Describe staged model and continues model CMM	V	4
13	Describe main idea of TMM	V	4
14	What are the different levels in TMM in the terms of their maturity goals	V	4
15	Explain model for process management? What are the its uses	V	4
16			

What are the caplibilty levels in SPICE? Reference model	V	6	
Describe the process of assessment with suitable diagram	V	4	17
Explain the Malcolm Baldrige model in detail	V	5	18
List out similities and differences between ISO and Malcolm model	V	4	19
Which are the seven categories make up award criteria	V	4	20
Write a note PCMM			21

	V	4	
22	What are the different maturity models in PCMM	V	4
23	Write about key areas in PCMM model	V	4

Unit:VI. SOFTWARE QUALITY ASSURANCE TRENDS

Sr. No.	**Question**	**CO No.**	**Marks University Year**
1	List the activities in PSP	VI	4

Describe the levels of PSP	2	VI	4
Write a short note on TSP process	3	VI	3
Explain TSP model in detail	4	VI	4
What are the benefits of OO Mythologies	5	VI	4
What are process mythologies	6	VI	4
Discuss RUP	7	VI	3
What is clean room software engineering	8	VI	3

9	How do we clarify software compliant during clean room technology	VI	3
10	Explain major tasks in Clean room technology	VI	5
11	List the benefits of Clean room technology	VI	3
12	Explain two defect prevention techniques	VI	3
13	Explain other techniques for defect prevention	VI	6
14	How software tools are used to block defect prevention	VI	2

	15	Explain Audit and its types	VI 3
	16	Explain the assessment and its types	VI 3
	17	What are the things need to be prepare before audit and assessment	VI 2
	18	Explain the walkthrough method	VI 6
	19	Explain in the detail inspection as type of formal technical review	VI 5

ADDITIONAL RESOURCES

1. Test director software
2. QTP Software
3. https://www.tutorialspoint.com/software_testing/
4. https://www.javatpoint.com/software-testing-tutorial
5. https://www.guru99.com/software-testing.html
6. https://www.softwaretestinghelp.com/software-quality-assurance/
7. NPTEL Course : Software Testing

314446 Software Laboratory-I

SYLLABUS

Teaching Scheme:	Credits	Examination Scheme:
Practical : 4 Hours/Week	02	Term Work : 25 Marks Practical: 50 Marks Oral : 50 Marks

Prerequisites:

1. Data structures and files.
2. Discrete Structure.
3. Software engineering principles and practices.

Course Objectives :

1. Understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
2. To provide a strong formal foundation in database concepts, recent technologies and best industry practices.
3. To give systematic database design approaches covering conceptual design, logical design and an overview of physical design.
4. To learn the SQL and NoSQL database system.
5. To learn and understand various Database Architectures and its use for application development.
6. To programme PL/SQL including stored procedures, stored functions, cursors and packages.

Group A: Introduction to Databases (Study assignment – Any 2)

1. Study and design a database with suitable example using following database systems:

   Relational: SQL / PostgreSQL / MySQL

   Key-value: Riak / Redis

   Columnar: Hbase

   Document: MongoDB / CouchDB

   Graph: Neo4J

Compare the different database systems based on points like efficiency, scalability, characteristics and performance.

2. Install and configure client and server for MySQL and MongoDB (Show all commands and necessary steps for installation and configuration).

3. Study the SQLite database and its uses. Also elaborate on building and installing of SQLite.

Group B: SQL and PL/SQL

1. Design any database with at least 3 entities and relationships between them. Apply DCL and DDL commands. Draw suitable ER/EER diagram for the system.

2. Design and implement a database and apply at least 10 different DML queries for the following task. For a given input string display only those records which match the given pattern or a phrase in the search string. Make use of wild characters and LIKE operator for the same. Make use of Boolean and arithmetic operators wherever necessary.

3. Execute the aggregate functions like count, sum, avg etc. on the suitable database. Make use of built in functions according to the need of the database chosen. Retrieve the data from the database based on time and date functions like now (), date (), day (), time () etc. Use group by and having clauses.

4. Implement nested sub queries. Perform a test for set membership (in, not in), set comparison (<some, >=some, <all etc.) and set cardinality (unique, not unique).

5. Write and execute suitable database triggers .Consider row level and statement level triggers.

6. Write and execute PL/SQL stored procedure and function to perform a suitable task on the database. Demonstrate its use.

7. Write a PL/SQL block to implement all types of cursor.

8. Execute DDL statements which demonstrate the use of views. Try to update the base table using its corresponding view. Also consider restrictions on updatable views and perform view creation from multiple tables.

Group C: MongoDB

1. Create a database with suitable example using MongoDB and implement Inserting and saving document (batch insert, insert validation) Removing document Updating document (document replacement, using modifiers, upserts, updating multiple documents, returning updated documents)

2. Execute at least 10 queries on any suitable MongoDB database that demonstrates following querying techniques:

find and findOne (specific values)

Query criteria (Query conditionals, OR queries, $not, Conditional semantics)

Type-specific queries (Null, Regular expression, Querying arrays)

3. Execute at least 10 queries on any suitable MongoDB database that demonstrates following:
$ where queries

Cursors (Limits, skips, sorts, advanced query options)

Database commands

4. Implement Map reduce example with suitable example.

5. Implement the aggregation and indexing with suitable example in MongoDB. Demonstrate the following:

Aggregation framework

Create and drop different types of indexes and explain () to show the advantage of the indexes.

Group D: Mini Project / Database Application Development

Student group of size 3 to 4 students should decide the statement and scope of the project which will be refined and validated by the faculty considering number of students in the group. Draw and normalize the design up to at ER Diagram least 3NF in case of back end as RDBMS.

COURSE OUTCOMES

CO No.	Course Outcome	Mapping With Assignment	Assessment Technique	Blooms Taxonomy Category
C314446.1	To install and configure database systems	Group A & D	Continuous Assessment and Mock Practical Exam	Understand
C314446 .2	To analyze database models & entity relationship models	Group B 1 & Group D		Apply
C314446.3	To design and implement a database schema for a given problem-domain	Group B 2 & Group D		Design
C314446.4	To understand the relational and document type database systems	Group A		Understand
C314446.5	To populate and query a database using SQL DML/DDL commands.	Group B 3 to 8 & Group D		Design
C314446.6	To populate and query a database using MongoDB commands.	Group C 1 to 5		Design

TEACHING PLAN

Teaching Plan Short

Academic Year:- 2020-21 Semester :-I w. e. f. :- 21-6-2020

Class : - TE IT A & TE IT B Division: A & B

Subject :- DBMS Subject Code :- 314442

Faculty In charge :- Mrs. Swapna Bhavsar & Ketki Gawali No. of Lectures/ weeks: 4

- **Practical Plan**

Sr. No.	Assignment No.	Assignment Title	Start Date	End Date
Group A				
1.	1	Study and design a database with suitable example.	June Week 4	June Week 4
2.	2	Install and configure client and server for MySQL and MongoDB.	June Week 5	June Week 5
3	3	Study the SQLite database and its uses. Also elaborate on building and installing of SQLite.	August Week 5	August Week 5
Group B				
4	1	Design any database with at least 3 entities and relationships between them	June Week 5	July Week 2
5	2	Design and implement a database and apply at least 10 different DML queries	July Week 2	July Week 2
6	3	Execute the aggregate functions like count, sum, avg etc. on the suitable database	July Week 3	July Week 3
7	4	Implement nested sub queries.	July Week 4	August Week 1
8	5	Write and execute suitable database triggers.	August Week 3	August Week 3
9	6	Write and execute PL/SQL stored	August Week 4	August Week 4

		procedure and function to perform a suitable task on the database.		
10	7	Write a PL/SQL block to implement all types of cursor	August Week 5	August Week 5
11	8	Execute DDL statements which demonstrate the use of views.	July Week 4	July Week 4
Group C				
12	1	Create a database with suitable example using MongoDB and implement.	Sep Week 2	Sep Week 2
13	2	Execute at least 10 queries on any suitable MongoDB database.	Sep Week 3	Sep Week 3
14	3	Execute at least 10 queries on any suitable MongoDB database.	Sep Week 4	Sep Week 4
15	4	Implement Map reduce example with suitable example	Sep Week 5	Sep Week 5
16	5	Implement the aggregation and indexing with suitable example in MongoDB.	Sep Week 5	Sep Week 5
Group D				
17	1	Mini Project	August Week 5	October Week 1

PRACTICAL PRACTICE QUESTIONS

MYSQL & PL/SQL

Sr. No	Problem Statement	CO No.
1	Design any database with at least 3 entities and relationships between them. Apply DCL and DDL commands. Draw suitable ER/EER diagram for the system.	C314446 .2
2	Design and implement a database and apply at least 10 different DML queries for the following task. For a given input string display only those records which match the given pattern or a phrase in the search string. Make use of wild characters and LIKE operator for the same. Make use of Boolean and arithmetic operators wherever necessary	C314446.3
3	Execute the aggregate functions like count, sum, avg etc. on the suitable database. Make use of built in functions according to the need of the database chosen. Retrieve the data from the database based on time and date functions like now (), date (), day (), time () etc. Use group by and having clauses.	C314446.5
4	Implement nested sub queries. Perform a test for set membership (in, not in), set comparison (<some, >=some, <all etc.) and set cardinality (unique, not unique).	C314446.5
5	Write and execute suitable database triggers .Consider row level and statement level triggers.	C314446.5
6	Write and execute PL/SQL stored procedure and function to perform a suitable task on the database. Demonstrate its use.	C314446.5
7	Write a PL/SQL block to implement all types of cursor.	C314446.5
8	Execute DDL statements which demonstrate the use of views. Try to update the base table using its corresponding view. Also consider restrictions on updatable views and perform view creation from multiple tables.	C314446 .2
9	Write a procedure a. To add new employee into emp table b. Which will return number of employees working in the department? Pass the dept no.	C314446.5
10	Write a function c. That accepts employee number and returns the salary status as low, high, based on his salary.Which will show the level of the customer whether platinum, gold or silver	C314446.5

11	Write a procedure to find d. length of the string e. reverse of the string	C314446.5
12	Write a procedure to find f. length of the string g. reverse of the string	C314446.5
13	Write a procedure to find a. Sum of digit of the number b. Reverse of the given number	C314446.5
14	Write a function to find h. Sum of digit of the number i. Reverse of the given number.	C314446.5
15	Write a function which j. Will accept input as a number and print whether it is even or odd k. Will find the largest number among three numbers.	C314446.5
16	"Managing customer orders system" Scenario: 1. Customer information (unique id, contact number) 2. Customer can place many orders but given purchase order is placed by one customer. 3. Purchase order has many to many relationship with stock item. Write a database trigger to update a "stock" table when a record is inserted in the "orders" table	C314446.5
17	For University database execute following queries: Department (dept_name, building, budget) Instructor (inst_id, name, salary, dept_name) Course (course_id, title, credits, dept_name) Teaches (course_id, inst_id) • Find the names of all instructors in Computer dept who have salary greater than 70000. • Find the names of instructors who are working in physics dept. • Find the names of instructors whose names are exactly five chracaters. • Create a view to find out only instructors who have taught some course.	C314446.2, C314446.5

	• Find the names of all instructors whose salary is greater than at least one instructor in biology dept. • Find the names of all departments whose name includes substring " i "	
18	For University database execute following queries: Department (dept_name, building, budget) Instructor (inst_id, name, salary, dept_name) Course (course_id, title, credits, dept_name) Teaches (course_id, inst_id) • Create a view to find instructor name and course for instructors in IT department. • Find the names of all departments whose name includes substring " i ". • List the entire instructor relation in descending order. • Find the names of all instructors whose salary is greater than at least one instructor in biology dept. • Find titles along with department where department must end with " y ". • Find the titles along with department name of biology department.	C314446.2, C314446.5
19	For University database execute following queries: Department (dept_name, building, budget) Instructor (inst_id, name, salary, dept_name) Course (course_id, title, credits, dept_name) Teaches (course_id, inst_id) • Find the average salary of the instructors who are in music dept. • Find the average salary in each dept. • Find out department name with average salary in each department where average salary is greater than 40000. • Find the names of all instructors whose salary is greater than at least one instructor in biology dept. • Display joining date of all instructors.	C314446.2, C314446.5
20	Consider a relational database Supplier (Sid, Sname, address) Parts(Pid, Pname, color) Catalog(Sid, Pid, cost) Write SQL queries for the following: i) Find the names of suppliers who supply some red parts.	C314446.2, C314446.5

	ii) Find the names of all parts whose cost is more than Rs.250. iii) Find name of all parts whose color is green. iv) Find number of parts supplied by each supplier	

MONGODB

Sr. No	Problem Statement	CO No.
1	Create a database with suitable example using MongoDB and implement inserting and saving document (batch insert, insert validation) Removing document Updating document (document replacement, using modifiers, upserts, updating multiple documents, returning updated documents)	C314446.6
2	Execute at least 10 queries on any suitable MongoDB database that demonstrates following querying techniques: find and findOne (specific values) Query criteria (Query conditionals, OR queries, $not, Conditional semantics) Type-specific queries (Null, Regular expression, Querying arrays)	C314446.6
3	Execute at least 10 queries on any suitable MongoDB database that demonstrates following: $ where queries Cursors (Limits, skips, sorts, advanced query options) Database commands	C314446.6
4	Implement Map reduce example with suitable example.	C314446.6
5	Implement the aggregation and indexing with suitable example in MongoDB. Demonstrate the following: Aggregation framework Create and drop different types of indexes and explain () to show the advantage of the indexes.	C314446.6
6	Place an order of any five products from computer Shoppe like – keyboard, monitor mouse, printer, processor, switch, modem etc. and prepare a bill for the same	C314446.6
7	Place an order of any five products from computer Shoppe like – keyboard, monitor mouse, printer, processor, switch, modem etc. and prepare a bill for the same.	C314446.6
8	For student database execute following queries: a. Find the record of the students who has got the highest marks in DBMS subject. b. Find the average result of TOC subject. c. Find the record of the students who has got the lowest marks in CNT subject. d. Find the total number of students who scored first class.	C314446.6
9	Implement map reduce operation for super market.	C314446.6
10	Implement map reduce operation for stationary shop.	C314446.6
11	Create university database (using MongoDB)	C314446.6

	a. Find the list of teachers in IT dept. b. Find the list of teachers who have salary greater than 50000. c. Find the teacher's list in descending order. d. Remove the teacher whose status is not approved. e. Give the increment of rs.20000 that has salary less than 30000.	
12	Create library database (using MongoDB) a. List the books of management subjects. b. List the books whose publication is "Pearson" c. List the number of journals. d. List the number of books which price is less than rs.500. e. Find the total investment for IT dept (IT books).	C314446.6
13	Create Hotel management database using MongoDB & database should perform following operations. • Add • Delete • Update • Search • Display	C314446.6
14	Create Student registration details database using MongoDB & database should perform following operations. • Add • Delete • Update • Search • Display	C314446.6
15	Create teacher database which contains the information of teacher_id, name of teacher, department of teacher,salary and status of teacher. (Status : Approved/Not Approved)Design and implement any five queries using mongoDB.	C314446.6

ORAL QUESTION BANK

MYSQL Assignments

1. What is open source database? Compare all databases.
2. What is the difference between DBMS and RDBMS?
3. What is SQL?
4. What is Non SQL?
5. What is structured and unstructured database?
6. What is difference between MySQL and MongoDB?
7. Explain all the constraints that can be applied on the table.
8. Explain the codd's rules for relational database design.
9. What is an E-R Model?
10. What is an Entity, Attribute?
11. What is a Relation Schema and a Relation?
12. Give example of following relationships :
    a. Many-to-One
    b. One-to-One
    c. One-to-Many
    d. Many-to-Many
13. What is the difference between Primary key and Super key?
14. What is Primary key?
15. What is foreign key and what is its importance?
16. What do you understand by Referential integrity?
17. Explain MYSQL data types.
18. What is the purpose of Index?
19. What difference is between delete and drop statement?
20. What is the difference between truncate command, drop command and delete command?
21. What are the differences between DDL and DML statements?
22. Explain DCL and DDL commands.
23. What is the use of aggregate functions?

24. What does join operation do?
25. What are different types of Join operations?
26. Explain all date functions, string functions.
27. What is the purpose of group by clause in the SELECT statement?
28. What are the nested queries? Explain Set membership operators, set comparison operators and set cardinality operators.
29. How PL/SQL is more advantageous than SQL?
30. What is difference between stored procedure and function?
31. How is stored procedure or function invoked in the main PL/SQL code?
32. How check constraints are applied in MYSQL?
33. What is row level trigger and statement level trigger?
34. What is implicit and explicit cursor? Explain it with an example.
35. What is the purpose to create view? What is an updatable view?

MONGODB Assignments

1. Which type of databases is mongoDB? And Why?
2. What is JSON? How do we use JSON in mongoDB?
3. Explain MongoDB data types.
4. What is the difference between insert and batchinsert?
5. What is upsert?
6. What is difference between find and findOne?
7. Explain CRUD operations in MongoDB with an example.
8. Explain different conditional operators in mongoDB.
9. How to display particular string using regular expression?
10. How to represent null values?
11. What is the difference between where clause in Mysql and in MongoDB?
12. . Explain the difference between limit and skip. Can we use both commands in single query?

13. How to remove database?
14. Explain cursor with example.
15. What do you mean by map reduce function, why is it used?
16. What is the difference between map reduce function and aggregate function?
17. What is indexing? And types of indexing?
18. Explain aggregation framework with all operators.
19. Explain explain () function.

ADDITIONAL RESOURCES

1. https://www.w3schools.com/sql/
2. https://www.tutorialspoint.com/mongodb/index.htm
3. MongoDB: The Definitive Guide, 3rd Edition

314447
Software Laboratory-II

SYLLABUS

Teaching Scheme:	Credits	Examination Scheme:
Practical : 4 Hours/Week	02	Term Work : 25 Marks Practical: 50 Marks

Prerequisites:

1. C programming.
2. Fundamental of Data Structures.

Course Objectives :

1. To introduce and learn Linux commands required for administration.
2. To learn shell programming concepts and applications.
3. To demonstrate the functioning of OS basic building blocks like processes, threads under the LINUX.
4. To demonstrate the functioning of OS concepts in user space like concurrency control (process synchronization, mutual exclusion & deadlock) and file handling in LINUX.
5. To aware Linux kernel source code details.
6. To demonstrate the functioning of OS concepts in kernel space like embedding the system call in any LINUX kernel.

Guidelines for Instructor's Manual

1. The faculty member should prepare the laboratory manual for all the experiments and it should be made available to students and laboratory instructor/Assistant.

Guidelines for Student's Lab Journal

1. Student should submit term work in the form of handwritten journal based on specified list of assignments.
2. Practical Examination will be based on the term work.
3. Candidate is expected to know the theory involved in the experiment.
4. The practical examination should be conducted if and only if the journal of the candidate is complete in all respects.

Guidelines for Lab /TW Assessment

1. Examiners will assess the term work based on performance of students considering the parameters such as timely conduction of practical assignment, methodology adopted for implementation of practical assignment, timely submission of assignment in the form of handwritten write-up along with results of implemented assignment, attendance etc.
2. Examiners will judge the understanding of the practical performed in the examination by asking some questions related to theory & implementation of experiments he/she has carried out.
3. Appropriate knowledge of usage of software and hardware related to respective laboratory should be checked by the concerned faculty member.

As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers of the program in journal may be avoided. There must be hand-written write-ups for every assignment in the journal. The DVD/CD containing students

programs should be attached to the journal by every student and same to be maintained by department/lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints at Laboratory.

Suggested List of Laboratory Assignments

Assignment No. 1:

Shell programming :Write a program to implement an address book with options given below:

a) Create address book. b) View address book. c) Insert a record. d) Delete a record.

e) Modify a record.f) Exit.

Assignment No. 2 :

Process control system calls: The demonstration of FORK, EXECVE and WAIT system calls along with zombie and orphan states.

a. Implement the C program in which main program accepts the integers to be sorted. Main

program uses the FORK system call to create a new process called a child process. Parent process sorts the integers using sorting algorithm and waits for child process using WAIT system call to

sort the integers using any sorting algorithm. Also demonstrate zombie and orphan states.

b. Implement the C program in which main program accepts an integer array. Main program uses

the FORK system call to create a new process called a child process. Parent process sorts an integer array and passes the sorted array to child process through the command line arguments of

EXECVE system call. The child process uses EXECVE system call to load new program that uses this sorted array for performing the binary search to search the particular item in the array.

Assignment No. 3:

Implement multithreading for Matrix Multiplication using pthreads.

Assignment No. 4:

Thread synchronization using counting semaphores. Application to demonstrate: producer-consumer problem with counting semaphores and mutex.

Assignment No. 5:

Thread synchronization and mutual exclusion using mutex. Application to demonstrate: Reader-Writer problem with reader priority.

Assignment No. 6:

Deadlock Avoidance Using Semaphores: Implement the deadlock-free solution to Dining Philosophers problem to illustrate the problem of deadlock and/or starvation that can occur when many synchronized threads are competing for limited resources.

Assignment No. 7:

Inter process communication in Linux using following.

a.Pipes: Full duplex communication between parent and child processes. Parent process writes a pathname of a file (the contents of the file are desired) on one pipe to be read by child process and child process writes the contents of the file on second pipe to be read by parent process and displays on standard output.

b.FIFOs: Full duplex communication between two independent processes. First process accepts sentences and writes on one pipe to be read by second process and second process counts number of characters, number of words and number of lines in accepted sentences, writes this output in a text file and writes the contents of the file on second pipe to be read by first process and displays on standard output.

Assignment No. 8:

Inter-process Communication using Shared Memory using System V.Application to demonstrate: Client and Server Programs in which server process creates a shared memory segment and writes the message to the shared memory segment. Client process reads the message from the shared memory segment and displays it to the screen.

Assignment No. 9:

Implement an assignment using File Handling System Calls (Low level system calls like open, read, write, etc).

Assignment No. 10:

Implement a new system call in the kernel space, add this new system call in the Linux kernel by the compilation of this kernel (any kernel source, any architecture and any Linux kernel

distribution) and demonstrate the use of this embedded system call using C program in user space.

References :

1.Das, Sumitabha, UNIX Concepts and Applications, TMH, ISBN-10: 0070635463, ISBN-13: 978-0070635463, 4th Edition.

2. Kay Robbins and Steve Robbins, UNIX Systems Programming, Prentice Hall, ISBN-13: 978-0134424071, ISBN-10: 0134424077, 2nd Edition.

3. Mendel Cooper, Advanced Shell Scripting Guide, Linux Documentation Project, Public domain.

COURSE OUTCOMES

CO No.	Course Outcome	Mapping With Assignment	Assessment Technique	Blooms Taxonomy Category
CO1	To understand the basics of Linux commands and program the shell of Linux.	1	CONTINOUS ASSESSMENT &MOCK TEST	Understanding
CO2	To develop various system programs for the functioning of operating system.	2		Applying
CO3	To implement basic building blocks like processes, threads under the Linux.	3, 4, 5,6		Creating
CO4	To develop various system programs for the functioning of OS concepts in user space like concurrency control and file handling in linux.	7, 8, 9		Applying
CO5	To design and implement Linux Kernel Source Code.	10		Creating
CO6	To develop the system program for the functioning of OS concepts in kernel space like embedding the system call in any linux kernel.	10		Applying

references

TEACHING PLAN

Teaching Plan Short

- Academic Year:-2020-21 Semester :- I w. e. f. :-20th June 2020
- Class : - TE Division: A & B
- Subject :Operating System Subject Code :- 314444
- Faculty In charge :-Mr. C. A. Ghuge ,Ms. Yogita Fatangare
- No. of Lectures/ weeks: 04

- **Practical Plan**

Sr. No.	Assignment No.	Assignment Title	Start Date	End Date
1.	1	Shell programming Write a program to implement an address book with options given below: a) Create address book. b) View address book. c) Insert a record. d) Delete a record. e) Modify a record. f) Exit.	3rd week June	1st Week July
2.	2a.	Process control system calls: The demonstration of FORK, EXECVE and WAIT system calls along with zombie and orphan states. a. Implement the C program in which main program accepts the integers to be sorted. Main program uses the FORK system call to create a new process called a child process. Parent process sorts the integers using sorting algorithm and waits for child process using WAIT system call to sort the integers using any sorting algorithm. Also demonstrate zombie and orphan states.	2nd week July	2nd week july
3	2b	Implement the C program in which main program accepts an integer array. Main program uses the FORK system call to create a new process called a child process. Parent process sorts an integer array and passes the sorted array to child process	3rd week july	3rd week July

		through the command line arguments of EXECVE system call. The child process uses EXECVE system call to load new program that uses this sorted array for performing the binary search to search the particular item in the array.		
4	3	Implement multithreading for Matrix Multiplication using pthreads.	4th week July	4th week July
5	4	Thread synchronization using counting semaphores. Application to demonstrate: producer-consumer problem with counting semaphores and mutex.	1st week August	1st week August
6	5	Thread synchronization and mutual exclusion using mutex. Application to demonstrate: Reader-Writer problem with reader priority.	3rd week August	3rd week August
7	6	Deadlock Avoidance Using Semaphores: Implement the deadlock-free solution to Dining Philosophers problem to illustrate the problem of deadlock and/or starvation that can occur when many synchronized threads are competing for limited resources.	4th week August	4th week August
8	7	Inter process communication in Linux using following. a. Pipes: Full duplex communication between parent and child processes. Parent process writes a pathname of a file (the contents of the file are desired) on one pipe to be read by child process and child process writes the contents of the file on second pipe to be read by parent process and displays on standard output. b. FIFOs: Full duplex communication between two independent processes. First process accepts sentences and writes on one pipe to be read by second process and second process counts number of characters, number of words and number of lines in accepted sentences,	1st week Sept.	1st week Sept.

		writes this output in a text file and writes the contents of the file on second pipe to be read by first process and displays on standard output.		
10	8	Inter-process Communication using Shared Memory using System V. Application to demonstrate: Client and Server Programs in which server process creates a shared memory segment and writes the message to the shared memory segment. Client process reads the message from the shared memory segment and displays it to the screen.	2nd week Sept.	2nd week Sept
11	9	Implement an assignment using File Handling System Calls (Low level system calls like open, read, write, etc).	3rd week Sept.	3rd week Sept.
12	10	Implement a new system call in the kernel space, add this new system call in the Linux kernel by the compilation of this kernel (any kernel source, any architecture and any Linux kernel distribution) and demonstrate the use of this embedded system call using C program in user space.	4th week Sept.	4th week Sept.

PRACTICAL PRACTICE QUESTIONS

1. Shell programming Write a program to implement an address book with options given below: a) Create address book. b) View address book. c) Insert a record. d) Delete a record. e) Modify a record. f) Exit.
2. Process control system calls:

   Implement the C program in which main program accepts the integers to be sorted. Main program uses the fork system call to create a new process called a child process. Parent process sorts the integers using **merge sort** and waits for child process using wait system call to sort the integers using **quick sort**. Also demonstrate zombie state.

3. Process control system calls:

   Implement the C program in which main program accepts the integers to be sorted. Main program uses the fork system call to create a new process called a child process. Parent process sorts the integers using **insertion sort** and waits for child process using wait system call to sort the integers using **selection sort**. Also demonstrate orphan state.

4. Process control system calls: The demonstration of fork, execve

   Implement the C program in which main program accepts an integer array. Main program uses the fork system call to create a new process called a child process. Child process sorts an integer array and usesexecve system call to load new program that uses this sorted array to find largest element in the array.

5. Process control system calls: The demonstration of fork, execve

   Implement the C program in which main program accepts an integer array. Main program uses the fork system call to create a new process called a child process. Child process sorts an integer array and usesexecve system call to load new program that uses this sorted array to search element using binary search

6. Thread management using pthread library: Implement matrix multiplication using multithreading. Application should have pthread_create, pthread_join, pthread_exit. In the program, every thread must return the value and must be collected in pthread_join in the main function. Final sum of row-column multiplication must be done by main thread (main function).

7. Thread synchronization using counting semaphores and mutual exclusion using mutex. Application to demonstrate: producer consumer problem with counting semaphores and mutex.

8. Deadlock Avoidance using Semaphores: Implement the deadlock free solution to Dining Philosophers problem to illustrate the problem of deadlock and/or starvation that can occur when many synchronized threads are competing for limited resources.

9. Inter process communication in Linux using Pipes : Full duplex communication between parent and child processes. Parent process accepts the pathname (the contents of the file are desired) from user and writes it on one pipe to be read by child process and child process writes total number of characters of the file on second pipe to be read by parent process and displays on standard output.

10. Inter process communication in Linux using Pipes : Full duplex communication between parent and child processes. Parent process writes a pathname of a file (the contents of the file are desired) on one pipe to be read by child process and child process writes the contents of the file on second pipe to be read by parent process and displays on standard output.

11. Inter process communication in Linux using FIFOs: Full duplex communication between two independent processes. First process accepts a sentence from user and writes on one pipe to be read by second process and second process counts number of upper case letters, lower case letters and number of special symbols in accepted sentence, writes this output in a text file named “gtk.txt” and writes the contents of the file on second pipe to

be read by first process and displays on standard output.

12. FIFOs: Full duplex communication between two independent processes. First process accepts sentences and writes on one pipe to be read by second process and second process counts number of characters, number of words and number of lines in accepted sentences, writes this output in a text file and writes the contents of the file on second pipe to be read by first process and displays on standard output.

13. Inter-process Communication using Shared Memory using System V. Application to demonstrate: Client and Server Programs in which server process creates a shared memory segment and writes the message to the shared memory segment. Client process reads the message from the shared memory segment and displays it to the screen.

14. Implement an assignment using File Handling System Calls (Low level system calls like open, read, write, etc).

15. Implement a new system call in the kernel space, add this new system call in the Linux kernel by the compilation of this kernel (any kernel source, any architecture and any Linux kernel distribution) and demonstrate the use of this embedded system call using C program in user space.

ORAL QUESTION BANK

Assignment 1

1. What is a UNIX shell?
2. What are the different types of commonly used shells on a typical Linux system?
3. What needs to be done before you can run a shell script from the command line prompt?
4. How do you terminate a shell script if statement?
5. What UNIX operating system command would you use to display the shell's environment variables?
6. How do you access command line arguments from within a shell script?
7. Within a UNIX shell scripting loop construct, what is the difference between the break and continue?
8. What is the significance of $#?
9. What is the difference between $* and $@?
10. Given a file, write a command sequence to find the count of each word.
11. What is the difference between $$ and $!?
12. What is the significance of $?

Assignment 2

1. Write and implement any five options of ps command from command manual.
2. Write and implement the top command.
3. Explain with example, how to make the process to run at background?
4. Write and implement any five options of kill command from command manual.
5. What is nice value? Write and implement nice command.
6. Explain with example, how to show processes created by system?
7. What is zombie and orphan states.
8. What is the use of wait() and waitpid() function
9. Explain execve() function .
10. Explain fork() function

Assignment 3

1. Explain thread.
2. Difference between thread and process.
3. What is multithreading? Advantages of multithreading.
4. Explain use of pthread_create()
5. Explain pthread_join(),pthread_exit()
6. What is use of –lpthread
7. Types of thread

Assignment 4

1. What is critical section.
2. Three conditions for critical section
3. Explain semaphore and types
4. Explain sem_init(),sem_wait(),sem_post(),sem_destroy() functions.
5. Explain mutex.
6. Explain producer consumer problem.
7. What is the difference between pthread and lpthread?
8. How binary and counting semaphores are differentiated in Linux functions?

Assignment 5

1. What is the difference between mutex and binary semaphore?
2. How many number of maximum philosophers will this problem have?
3. What is deadlock?
4. Explain deadlock 4 necessary conditions for deadlock to occur
5. Alternative solutions to deadlock problem.
6. Write the use of -pthread flag with gcc.
7. What is difference between -pthread and -lpthreadgcc flags?

8. What is difference between mutex and semaphores in Linux multithreading?

Assignment 6

1. List out different IPC mechanisms

2. Explain PIPE

3. How to create pipe.

4. Difference between PIPE and FIFO

5. How to create FIFO

6. Use of signal

7. Types of signal

8. What is SIGCHLD.

9. Enlist the system calls related to Signals.

10. What are the advantages of FIFO over pipe?

11. Explain the situation where FIFO is appropriate structure used over pipe.

12. State the difference between named and unnamed pipes.

13. Explain the use of | operator with the example of multiple commands. (At least three examples with practical demonstration is expected).

15. What is difference between pipe and shared memory implementation in Linux IPC?

Assignment 7

1. What is difference among mainline, stable and longterm kernel release?

2. Which command is used to find the current kernel version installed on your system?

3. Write the command used to show the Linux distribution, version and code name ofyour system?

4. Enlist the supporters companies of Linux kernel.

5. Difference between microkernel and monolithic kernel.

6. Examples of microkernel and monolithic kernel.

Assignment 8

1. State the difference between kernel space and module.
2. List and three options of dmesg command and explain their meaning.
3. Explain the difference between printf and printk and show in tabular format.
4. Explain insmod,lsmod,rmmod.
5. Explain printk function
6. Explain Makefileamd make utility.
7. How to get information of kernel module
8. How to insert and remove kernel module
9. What is use of having loadable module

Assignment 9

1. Explain system call
2. Difference between system call and library function.
3. Explain ltrace and strace
4. How to add system call in linux kernel.
5. Explain syscall()

Assignment 10

1. Explain virtual file system
2. Explain proc file system
3. Explain cat /proc/hello_proc
4. Explain functions

proc_create

remove_proc_entry

hello_proc_show()

seq_printf

hello_proc_open()

single_open()

1. What are limitations of proc file system

ADDITIONAL RESOURCES

1. www.tutorialspoint.com
2. https://spoken-Tutorial.org/tutorialsearch/?search_foss=BASH&search_language=English-USA
3. www.byte-code.com

4.

314448

Software Laboratory-III

SYLLABUS

314448 : SOFTWARE LABORATORY – III

Teaching Scheme	Credits	Examination Scheme
Practical : 2 Hours/Week	01	Term Work : 50 Marks

Preamble:

A major component of the course is a Graphical User Interface development. The objective is to develop a GUI by using concepts learned from Software Engineering and Project management. At the beginning of the course, Course Teacher will form project teams with maximum 3 members. During the semester, the project team will work together through all the phases of development cycle up to design, from an initial feasibility study to designing, after designing phase students will deploy the designed system and will make a series of presentations and reports of the work.

Prerequisites:

1. Programming fundamentals.
2. Problem solving skills.

Course Objectives :

1. To understand the nature of software complexity in various application domains, disciplined way of software development and software life cycle process models.
2. To introduce principles of agile software development, the SCRUM process and agile practices.
3. To know methods of capturing, specifying, visualizing and analyzing software requirements.
4. To understand concepts and principles of software design and architecture.
5. To understand user-centric design approach.
6. To apply principles of designing for effective user interfaces.

Course Outcomes :

1. To identify the needs of users through requirement gathering.
2. To apply the concepts of Software Engineering process models for project development.
3. To apply the concepts of HCI for user-friendly project development.
4. To deploy website on live web server and access through URL.
5. To understand, explore and apply various web technologies.
6. To develop team building for efficient project development.

Guidelines for Instructor's Manual

1. The faculty member should prepare the laboratory manual for all the experiments and it should be made available to students and laboratory instructor/Assistant.

Guidelines for Student's Lab Journal

1. Student should submit term work in the form of handwritten journal based on specified list of

assignments.

2. Practical Examination will be based on the term work.

3. Candidate is expected to know the theory involved in the experiment.

4. The practical examination should be conducted if and only if the journal of the candidate is complete in all respects.

Guidelines for Lab /TW Assessment

1. Examiners will assess the term work based on performance of students considering the parameters such as timely conduction of practical assignment, methodology adopted for implementation of practical assignment, timely submission of assignment in the form of handwritten write-up along with results of implemented assignment, attendance etc.

2. Examiners will judge the understanding of the practical performed in the examination by asking some questions related to theory & implementation of experiments he/she has carried out.

3. Appropriate knowledge of usage of software and hardware related to respective laboratory should be checked by the concerned faculty member.

As a conscious effort and little contribution towards Green IT and environment awareness, attaching printed papers of the program in journal may be avoided. There must be hand-written write-ups for every assignment in the journal. The DVD/CD containing students programs should be attached to the journal by every student and same to be maintained by department/lab In-charge is highly encouraged. For reference one or two journals may be maintained with program prints at Laboratory.

SUGGESTED LIST OF LABORATORY ASSIGNMENTS

Group A :Website Design (HTML5, CSS, Bootstrap)

Assignment No. 1: Using HTML5 layout tags develop informative page with sections which include various images, links to other pages for navigation, make use of all possible formatting (for example font, color etc.).

Assignment No. 2: Apply CSS properties Border, margins, Padding, Navigation, dropdown list to page created in first assignment.

Group B : Website GUI Validation (JavaScript, PHP)

Assignment No. 3: Create form in HTML with all form elements apply form validations (e.g. Email, mobile, Pin code, Password).

Assignment No. 4: Validate URL, Email, Required using functions empty, preg_match, filter_var in PHP.

Group C : Website Working (Java Servlet)

Assignment No. 5: Understand servlet life cycle, create login page and apply proper validations with appropriate messages using doGet()/ doPost() methods.

Group D : Website Development (Mini-Project)

Assignment No. 6: Develop website using any CMS tool which falls into one of the categories blog, social networking, News updates, Wikipedia, E-commerce store. Website must include home page, and at least 3 forms (with Validation), use at list HTML5, PHP, CSS/Bootstrap, JavaScript web technologies. No database support is needed. Deploy website on live webserver and access through URL.

Write a complete report of web development stages for the chosen topic and attach printout of the same with screen shots of web pages. Proper use of every technique used for web designing should be followed like for designing wireframe is used. Human computer interaction and user experience concepts learned from HCI should be applied while web development process.

Guidelines for Mini project

1. Project group of maximum 3 students should be formed.
2. Every group member should participate in every stage of the web development.
3. Proper compilation of the report should be attached in the file in printed format.
4. Use of CMS should be done for only Assignment no 6 (Mini Project).
5. At the end of the semester, group should give a presentation of the Mini Project.

References:

1. HTML, XHTML and CSS, Fourth Edition by Steven M. Schafer, Wiley India Edition. ISBN: 978- 81-265- 1635-3.
2. Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP, 4thEdition by Ivan Bayross, BPB Publications. ISBN: 9788183330084.
3. Professional Word Press: Design and Development by Brad Williams, David Damstra, Hal Stern, Wrox publications Web Technologies Black Book: HTML, JavaScript, PHP, Java, JSP, XML and AJAX by Kogent Learning Solutions Inc. ISBN: 9788126554560, 8126554568.
4. Wordpress for Web developers: An introduction to web professionals by Stephanie Leary, Apress Publications. ISBN: 9781430258667, 1430258667.

COURSE OUTCOMES

CO No.	Course Outcome	Mapping With Unit	Assessment Technique	Blooms Taxonomy Category
C314445 .1	To identify the needs of users through requirement gathering.	Assignment No. 1-6	Practical Assignment	III. Applying
C314445.2	To apply the concepts of Software Engineering process models for project development.	Assignment No. 6	Practical Assignment	III. Applying
C314445.3	To apply the concepts of HCI for user-friendly project development.	Assignment No. 1-6	Practical Assignment	III. Applying
C314445.4	To deploy website on live web server and access through URL.	Assignment No. 6	Practical Assignment	III. Applying
C314445 .5	To understand, explore and apply various web technologies.	Assignment No.1-5	Practical Assignment	II.Understanding, III. Applying, IV. Analyzing
C314445 .6	To develop team building for efficient project development.	Assignment No. 6	Practical Assignment	VI. Creating

PREREQUISITES

Sr. No.	Assignment Number	Prerequisite subject name
1.	I	1. Programming fundamentals. 2. Problem solving skills.
2.	II	1. Programming fundamentals. 2. Problem solving skills.
3.	III	1. Programming fundamentals. 2. Problem solving skills.
4.	IV	1. Programming fundamentals. 2. Problem solving skills.
5.	V	1. Programming fundamentals. 2. Problem solving skills.
6.	VI	1. Programming fundamentals. 2. Problem solving skills. 3.Software Engineering

references

TEACHING PLAN

Teaching Plan Short

Academic Year:-2020-21	Semester:-I	w. e. f. :- 20-6-2020
Class : - TEIT		Division: A & B
Subject :- SOFTWARE LABORATORY – III		Subject Code :- 314448
Faculty In charge: Mr. Digvijay Patil MrsJyoti Jadhav		No. of Practical/ weeks: 2

- **Practical Plan**

Sr. No.	Assignment No.	Assignment Title	Start Date	End Date
1.	1	Using HTML5 layout tags develop informative page with sections which include various images, links to other pages for navigation, make use of all possible formatting (for example font, color etc.).	June Mid week	June Last week
2.	2	Apply CSS properties Border, margins, Padding, Navigation, dropdown list to page created in first assignment.	July first week	July second week
3.	3	Create form in HTML with all form elements apply form validations (e.g. Email, mobile, Pin code, Password).	July second week	July last week
4.	4	Validate URL, Email, Required using functions empty, preg_match, filter_var in PHP.	August 2nd week	August 3rd week
5.	5	Understand servlet life cycle, create login page and apply proper validations with appropriate messages using doGet()/ doPost() methods.	August last week	September 1st week
6.	6	**Website Development (Mini-Project)** Develop website using any CMS tool which falls into one of the categories blog, social networking, News updates, Wikipedia, E-commerce store. Website must include home page, and at least 3 forms (with Validation), use at list HTML5, PHP, CSS/Bootstrap, JavaScript web technologies. No database support is needed. Deploy website on live webserver	September 2nd week	September 3rd week

		and access through URL. Write a complete report of web development stages for the chosen topic and attach printout of the same with screen shots of web pages. Proper use of every technique used for web designing should be followed like for designing wireframe is used. Human computer interaction and user experience concepts learned from HCI should be applied while web development process.		

ORAL QUESTION BANK

Sr. No.	Question	CO No.
1	1) What is HTML? 2) What are Tags? 3) Do all HTML tags have? 4) What are some common lists that are used when designing a page? 5) What is the difference between HTML elements and tags? 8) How to insert a copyright symbol on a browser page? 9) How do you keep list elements straight in an HTML file? 10) Does a hyperlink only apply to text? 14) What is a marquee? 16) How to make a picture a background image of a web page?	C314448:1. C314448:3. C314448:5
2	1) What is CSS? 2) What is the origin of CSS? 3) What are the different variations of CSS? 4) How can you integrate CSS on a web page? 5) What are the advantages of CSS? 6) What are the limitations of CSS? 7) What are the CSS frameworks? 8) Why background and color are the separate properties if they should always be set together? 9) What is the difference between CSS2 and CSS3?	C314448:1. C314448:3. C314448:5
3	1) What is validation? 2) What is verification? 3) What is the difference between verification and validation? 4) How you implement validation in password field?	C314448:1. C314448:3. C314448:5
4	1) What is PHP? 2) What is PEAR in PHP? 3) Who is known as the father of PHP? 4) Explain the difference b/w static and dynamic websites? 5) Explain the difference between PHP4 and PHP5. 6) What are the popular frameworks in PHP? 7) What is "echo" in PHP?	C314448:1. C314448:3. C314448:5
5	1. What is different between web server and application server? 2. Which HTTP method is non-idempotent? 3. What is the difference between GET and POST method? 4. What is MIME Type?	C314448:1. C314448:3. C314448:5

	5. What is a web application and what is it's directory structure? 6. What is a servlet? 7. What are the advantages of Servlet over CGI? 8. What are common tasks performed by Servlet Container? 9. What is ServletConfig object? 10. What is ServletContext object? 11. What is difference between ServletConfig and ServletContext? 12. What is Request Dispatcher? 13. What is difference between PrintWriter and ServletOutputStream? 14. Can we get PrintWriter and ServletOutputStream both in a servlet? 15. How can we create deadlock situation in servlet? 16. What is the use of servlet wrapper classes? 17. What is SingleThreadModel interface? 18. Do we need to override service() method? 19. What is servlet life cycle? Explain with proper diagram. 20. Write the syntax.	
6	1) Explain project. 2) How you use HCI concept here? 3) How you use Software Engineering concept here? 4) What is team building planning of your project?	C314448:1. C314448:3. C314448:5 C314448:4 C314448:6