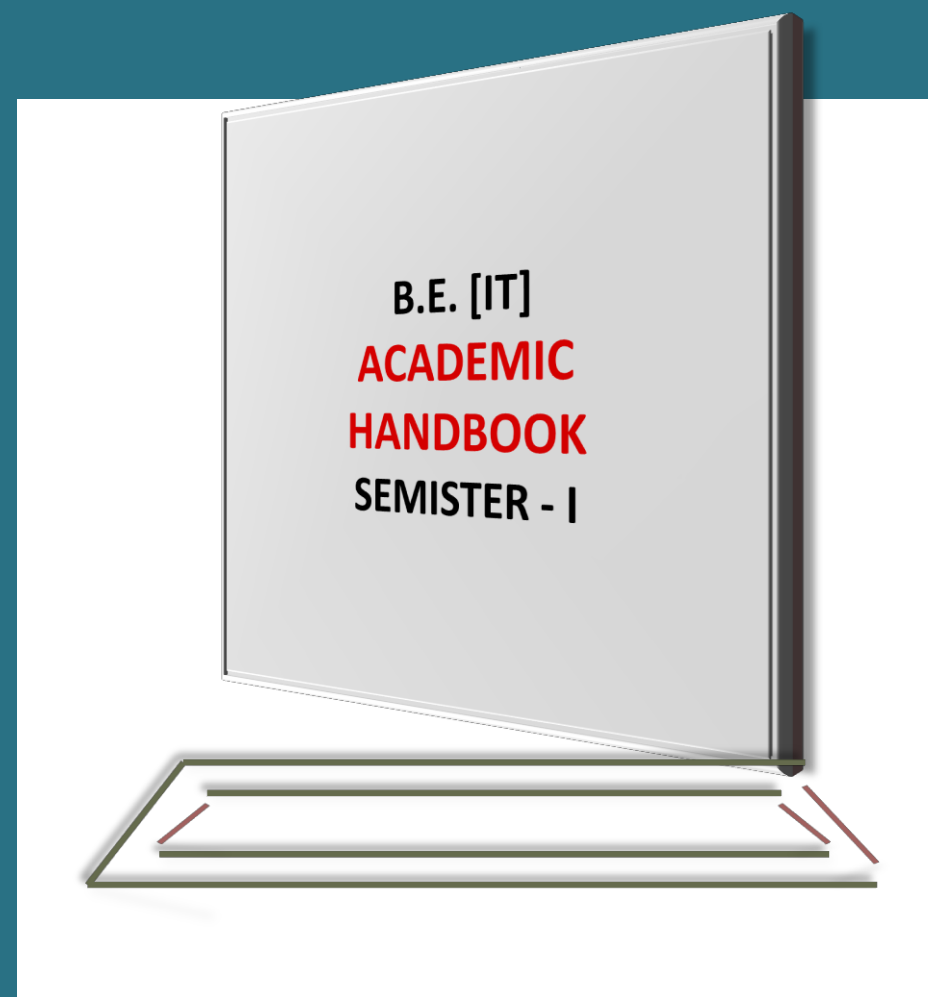




Sinhgad Institutes

RMD SINHGAD SCHOOL OF ENGINEERING
(RMDSSOE), Warje, Pune-58.
NAAC accredited with "A" grade



Academic Year 2019-2020

VISION AND MISSION



Sinhgad Technical Education Society's
RMD SINHGAD TECHNICAL INSTITUTES CAMPUS
RMD SINHGAD SCHOOL OF ENGINEERING

Approved by AICTE, New Delhi, Recognized by Government of
Maharashtra, affiliated by S.P. Pune University

VISION

उत्तमपुरुषान् उत्तमाभियंतृन् निर्मातुं कटीबद्धाः वयम्।

We are committed to produce good human beings
along with good Engineers.

MISSION

Holistic development of students and teachers is what we believe in and work for. We strive to achieve this by imbibing a unique value system, transparent work culture, excellent academic and physical environment conducive to learning, creativity and technology transfer. Our mandate is to generate, preserve and share knowledge for developing a vibrant society.

SILENT FEATURES

❖ Strength

- Affiliation to Savitribai Phule Pune University.
- Good academic performance.
- Experienced and qualified faculty and their retention.
- Transparent, conducive and collaborative work environment. Innovative teaching-learning practices.
- Sprawling 10 acre campus and infrastructure.
- Well-equipped library with adequate collection of books and e-resources.
- Effective implementation of VAPs, and STPs.
- Good placement record.
- Teacher guardian scheme.
- Promoting staff to do Ph. D. Industry Institute Interaction Cell.
- Under the aegis of the society which offers quality education for the past 24 years.
- Accessible location.

❖ Opportunities

- There is scope for an inter-disciplinary and collaborative research.
- To become centre of excellence in renewable energy and Wireless Sensor Networks.
- Development of e-learning resources.
- Networking and strengthening relationship with stakeholders.
- Induction of faculty with Ph.D qualification. Proximity to IT & Automobile industry hub for networking and partnership.

❖ Challenges

- Increasing the number of placements with higher perks.
- Bridging the gap between academia and industry.
- Attract meritorious students.

❖ Future Plan

- Industrial based research project for UG/PG/Ph.D.
- Employment oriented certification courses; considering industrial requirement.
- Enhancement in Training & Placement activities.
- Industrial training to students and faculties.
- Need based courses in association with industry and institutes.
- Innovative Research, Publications and Patents
- Upgrading laboratory facilities to promote research.

DEPARTMENTAL ACADEMIC COMMITTEE

Sr. No.	Name of the Committee	Designation / Responsibility
1	Dr. V.V. Dixit	Principal / Director
2	Mr. S. S. Mulik	Dean Academics
3	Mrs. Sweta Kale	H.O.D - I.T.
4	Ms. Suvarna Potdukhe	Academic Coordinator, I.T.
5	Ms. Pratibha Chavan	Academic Research Coordinator (ARC)
6	Mr. Suhas Chavan	Training and Placement Coordinator
8	Ms. Suvarna Potdukhe	Project Coordinator
9	Ms. Pratibha Chavan	I/c Exam-Section, I.T.
10	Ms. Prachi Sorte	SPPU PR/OR Coordinator
11	Mrs. Prajakta Kulkarni	I/c Time Table, I.T.
12	Ms. Kaveri Chaudhari	Result Analysis, I.T.
13	Mrs. Varsha Abhang	I/c Academic Handbook S.E., T.E. & B.E. (I.T.)

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B.E. (Information Technology) 2015 Course to be implemented from Academic Year 2019-20**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					

Abbreviations: TW: Term Work TH: Theory OR: Oral PR: Practical Sem: Semester

Computer Laboratory-VII (Information and Cyber Security+ Machine Learning and Application)

Computer Laboratory-VIII (Software Design and Modeling)

Elective I		Elective II	
414456 A	1. Wireless Communications	414457A	1. Software Defined Networks
414456B	2. Natural Language Processing	414457B	2. Soft Computing
414456C	3. Usability Engineering	414457C	3. Software Testing and Quality Assurance
414456D	4. Multicore and Concurrent Systems	414457D	4. Compiler Construction
414456E	5. Business Analytics and Intelligence	414457E	5. Gamification

Audit Course-V	
414461A	1. Emotional Intelligence
414461B	2. Green Computing
414461C	3. Critical Thinking
414461D	4. Statistical Learning model using R.

SEMESTER –II

Subject Code	Subject	Teaching Scheme			Examination Scheme					Total Marks	Credits
		Lecture	Practical	Tutorial	In-Sem	TW	PR	OR	End-Sem		
414462	Distributed Computing System	3	--	--	30	--	--	--	70	100	3
414463	Ubiquitous Computing	3	--	--	30	--	--	--	70	100	3
414464	Elective-III	3	2	--	30	25	--	25	70	150	4
414465	Elective-IV	3	--	--	30	--	--	--	70	100	3
414466	Computer Laboratory-IX	--	4	--	--	50	50	--	--	100	2
414467	Computer Laboratory-X	--	2	--	--	25	--	25	--	50	1
414468	Project Work	--	--	6	--	50	--	100	--	150	6
414469	Audit Course-VI	--	--	--	--	--	--	--	--	Grade	
Total		12	8	6	120	150	50	150	280	750	22
Total of Part-II		26				750					

Abbreviations: TW: Term Work TH: Theory OR: Oral PR: Practical Sem: Semester

Computer Laboratory-IX (Distributed Computing System)

Computer Laboratory-X (Ubiquitous Computing)

Elective III		Elective IV	
414464A	1. Internet of Things (IoT)	414465A	1. Rural Technologies and Community Development
414464B	2. Information storage and retrieval	414465B	2. Parallel Computing
414464C	3. Multimedia Techniques	414465C	3. Computer Vision
414464D	4. Internet and Web Programming	414464D	4. Social Media Analytics
414464E	5. Computational Optimization	414465E	5. Open Elective

Audit Course-VI	
414469A	1. IoT – Application in Engineering field
414469B	2. Entrepreneurship
414469C	3. Cognitive Computing
414469D	4. AI and Robotics

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RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE.

RMDSSOE/ Office /Academic/2019-20/ Sem-I/59

Date: 10th June 2019

ACADEMIC CALENDER SEM-I [2019-20]

[SE/TE/BE (Regular)]

[Notified on 10th June 2019]

Duration of Semester: **17/06/2019 to 18/10/2020**

Total Weeks: 18

Total weeks for Teaching: 14

WEEK NO.	DATES	PROGRAMME
I	17 th June 2019	Commencement of First Term
	17 th June 2019 to 21 st June 2019	Issue Provisional Roll No./ Registration of VAP / Training & Placement / Elective Subjects / Project Guide / Finalization of Project Topic
V	3 rd July 2019	Display of Attendance / Provisional Detention List / Non-Registration Students. [Send SMS / letters to Parents]
VII	29 th July 2019 to 2 nd Aug. 2019	SE, TE & BE: Mid Prelim Examination (Theory) (Max. Marks 30) [Based on I, II & III Units]
	5 th Aug. 2019	Display of Attendance / Provisional Detention List Students. [Send SMS / letters to Parents]
	7 th Aug. 2019	Display of Mid Prelim Examination Result.(SE/TE/BE)
VIII	5 th Aug. 2019 to 9 th Aug.2019	For TE/BE: Tentative dates for S.P.P. U. In Sem Examination (Max. Marks 30) [Based on I, II & III Units]
	9 th Aug.2019	Parent Meet
X	19 th Aug. 2019 to 23 rd Aug.2019	Mid-Term Submission during Practical Session only. (SE/TE/BE)
XI	26 th Aug. 2019 to 30 th Aug. 2019	For SE: Tentative dates for S.P.P. U. Phase-I Online Examination (Max. Marks 25) [Based on I & II Units]
XII	3 rd Sept 2019	Display of Attendance / Provisional Detention List Students. [Send SMS / letters to Parents]
XV	23 rd Sept. 2019 to 28 th Sept. 2019	For SE: Dates for S.P.P. U. Phase-II Online Examination (Max. Marks 25) [Based on III & IV Units]
XVI	30 th Sept. 2019 to 4 th Oct. 2019	Mock Practical & Final Submission during Practical Session & also Submit Term Work subjects files to respective teacher.
	4 th Oct. 2019	End of Teaching (Theory & Practical) Issue Term Grant Certificate to students after successfully completion of all subject T/w file duly signed by respective practical Subject teacher & Mock Oral / Practical Exam.(if possible, Only OR/PR subjects)
XVII	7 th Oct. 2019 to 11 th Oct. 2019	SE /TE & BE: Prelim Examination (Max. Marks 70) [Based on Unit- I to VI]
XVIII	15 th Oct. 2019	Display of Prelim Examination Result (SE/TE/BE)
	16 th Oct. 2019	Display of Final Attendance / Final Detention / Continuous Assessment Sheet. [Send Detention SMS/Letters to Parents]
		Compilation & Display of T/W Marks
	18 th Oct. 2019	Submit T/W marks through web portal to SPPU University.
XVIII - XXI	18 th Oct. 2019 to 5 th Nov. 2019	University (Oral / Practical) Exam.
XXII- XXV	14 th Nov. 2019 to 6 th December 2019	Tentative dates for University Exam. (Theory)
16th December 2019		Commencement of Second Term for Academic Year 2019-20.

Time tables are displayed separately.

Internal Examination [Unit Test] / S.P.P. U. Examination schedule will be displayed separately.

Schedule for **Cultural/Sports Events** will be displayed separately.

- Holiday's as per circular from **SPPU / STES** will be displayed separately.
- Identification of **Non-Performing students & remedial action** will be displayed separately.
- Academic Monitoring of all departments will be checked by **Principal & Dean (Academics)** along with HOD's.
- Guidelines for **Internal Assessment** will be displayed separately.

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DEAN ACADEMICS

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PRINCIPAL

Guidelines for Continuous & Internal Assessment

A) Continuous Assessment:

1. Record keeping of Continuous assessment marks should be kept with respective faculty member.
2. There will be frequent cross verification of faculty record with students file.

B) Internal Assessment: Scheme of 25 marks is as follows:

1. For S.E.[Information Technology] Regular Students

Sr. No.	Particulars	Marks
1	Attendance (TH/PR/TG)	05
2	Mid prelim	05
3	Prelim	05
5	Continuous Assessment	10

2. For T.E.[Information Technology] Regular Students

Sr. No.	Particulars	Marks
1	Attendance (TH/PR/TG)	05
2	Mid prelim	05
3	Prelim	05
5	Continuous Assessment	10

3. For B.E.[Information Technology] Regular Students

Sr. No.	Particulars	Marks
1	Attendance (TH/PR/TG)	05
2	Mid prelim	05
3	Prelim	05
5	Continuous Assessment	10

- Student can earn marks based on following criteria:
Students attending all TH/PR classes in 1st week of this semester will get additional 1 mark in T/W in all subjects.
- **For SE Students**
 1. Attendance more than 75% - full weightage of marks.
 2. 50% + marks in Unit Test I, II & III—Full weightage / Subject wise.
- **For TE Students**
 1. Attendance more than 75% - full weightage of marks.
 2. 50% + marks in Unit Test I—Full weightage / Subject wise.
 3. 50% + marks in Unit Test II Examination—Full weightage / Subject wise.
 4. 50% + marks in Unit Test III Examination—Full weightage / Subject wise.
- **For BE Students**
 1. Attendance more than 65% - full weightage of marks.
 2. 40% + marks in Unit Test I, II & III—Full weightage / Subject wise.

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DEAN ACADEMICS

RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE.
SECOND YEAR ENGG.(SE) INTERNAL EXAMINATION TIME-TABLE [A.Y. 2019-20 (SEMESTER-I)]

SCHEDULED TIME: Unit Test-I: 8.30 AM TO 09.30 AM Max. Marks: 30

Examination Based on Unit I & II

Unit Test-II: 8.30 AM TO 09.30 AM Max. Marks: 30

Examination Based on Unit III & IV

Unit Test-III: 9.00 AM TO 10.00 AM Max. Marks: 30

Examination Based on Unit V & VI

Sr. No.	Day & Dates for Internal Examination		Name of Branch				
	Mid Prelim Exam [Online + Theory]	Prelim Exam + Theory [Online]	Civil Engg.	Computer Engg.	Information Technology	E&TC Engg.	Mechanical Engg.
1	Monday , 29th July 2019	Monday , 7th Oct. 2019	Building Technology & Materials (201001)	Discrete structures & Graph Theory (210241)	Discrete Structures (214441)	Signal & Systems (204181)	Engg. Maths - III (207002)
2	Tuesday, 30th July 2019	Tuesday, 8th Oct. 2019	Engineering Mathematics-III (207001)	Digital Electronics & Logic Design (210242)	Computer Organization & Architecture (214442)	Electronic Devices & Circuits (204182)	Thermodynamics (202043)
3	Wednesday, 31st July 2019	Wednesday, 9th Oct. 2019	Surveying (201006)	Data Structure & Algorithms (210243)	Digital Electronics and Logic Design (214443)	Electric circuits & Machines (204183)	Strength of Materials (202051)
4	Thursday, 1st Aug 2019	Thursday, 10th Oct. 2019	Strength of Materials (201002)	Computer Organization & Architecture (210244)	Fundamentals of Data Structures (214444)	Data structures & Algorithms (204184)	Manufacturing Process - I (202041)
5	Friday, 2nd Aug 2019	Friday, 11th Oct. 2019	Geo Technical Engineering (201003)	Object Oriented Programming (210245)	Problem Solving and Object Oriented programming (214445)	Digital Electronics (204185)	Material Science (202044)



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RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE.

THIRD YEAR ENGG. (TE) INTERNAL EXAMINATION TIME-TABLE [A.Y. 2019-20 (SEMESTER-I)]

SCHEDULED TIME: Unit Test-I: 8.30 AM TO 09.30 AM Max. Marks: 30

Unit Test-II: 8.30 AM TO 09.30 AM Max. Marks: 15

Unit Test-III: 9.00 AM TO 11.00 AM Max. Marks: 50

Examination Based on Unit I & II

Examination Based on Unit III

Examination Based on Unit IV, V & VI

Sr. No.	Dates for Internal Examination		Name of Branch				
	Mid Prelim Exam [Online + Theory]	Prelim Exam [Online + Theory]	Civil Engg.	Computer Engg.	Information Technology	E&TC Engg.	Mechanical Engg.
1	Monday , 29th July 2019	Monday , 7th Oct. 2019	Hydrology & Water Resources Engineering (301001)	Theory of Computation (310241)	Theory of Computation (314441)	Digital Communication (304181)	Design of Machine Elements-I (302041)
2	Tuesday, 30th July 2019	Tuesday, 8th Oct. 2019	Infrastructure Engg.& Construction Techniques (301002)	Data Base Management Systems (310242)	Data Base Management Systems (314442)	Digital Signal processing (304182)	Heat Transfer (302042)
3	Wednesday, 31st July 2019	Wednesday, 9th Oct. 2019	Structural Design-I (301003)	Software Engineering & Project Management (310243)	Software Engineering & Project Management (314443)	Electromagnetics (304183)	Theory of Machines-II (302043)
4	Thursday, 1st Aug 2019	Thursday, 10th Oct. 2019	Structural Analysis-II (301004)	Information System and Engineering Economics (310242)	Operating System (314444)	Microcontrollers (304184)	Turbo Machines (302044)
5	Friday, 2nd Aug 2019	Friday, 11th Oct. 2019	Fluid Mechanics-II (301005)	Computer Networks (310245)	Human Computer Interaction (314445)	Mechatronics (304185)	Metrology and Quality Control (302045)




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FINAL YEAR ENGG. (BE) INTERNAL EXAMINATION TIME-TABLE [A.Y. 2019-20 (SEMESTER-I)]

SCHEDULED TIME: Unit Test-I: 8.30 AM TO 09.30 AM Max. Marks: 30

Unit Test-II: 8.30 AM TO 09.30 AM Max. Marks: 15

Unit Test-III: 9.00 AM TO 11.00 AM Max. Marks: 50

Examination Based on Unit I & II

Examination Based on Unit III

Examination Based on Unit IV, V & VI

Sr. No.	Dates for Internal Examination		Name of Branch				
	Mid Prelim Exam [Online + Theory]	Prelim Exam [Online + Theory]	Civil Engg.	Computer Engg.	Information Technology	E&TC Engg.	Mechanical Engg.
1	Monday , 29th July 2019	Monday , 7th Oct. 2019	Environmental Engineering -II (401001)	Higher performance Computing (410241)	Information and Cyber Security (414453)	VLSIDesign&Technology (404181)	Hydraulics &Pneumatics (402041)
2	Tuesday, 30th July 2019	Tuesday, 8th Oct. 2019	Transportation Engineering (401002)	Artificial Intelligence and robotics (410242)	Machine Learning and Applications (414454)	Computer Networks & Security (404182)	CAD/ CAM Automation (402042)
3	Wednesday, 31th July 2019	Wednesday, 9th Oct. 2019	Structural Design & Drawing -III (401003)	Data Analytics (410243)	Software Design and Modeling (414455)	Radiation & Microwave Technique	Dynamics of Machinery (402043)
4	Thursday, 1st Aug 2019	Thursday, 10th Oct. 2019	Elective I (401 004)	Elective I (410244)	Elective-I (414456)	Elective I (404184)	Elective I (402044)
5	Friday, 2nd Aug 2019	Friday, 11th Oct. 2019	Elective II (401 005)	Elective II (410245)	Elective-II (414457)	Elective II (404185)	Elective II (402045)



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**RMD SINHGAD SCHOOL OF ENGINEERING, WARJE,
PUNE. DEPARTMENT OF INFORMATION
TECHNOLOGY**

B.E. IT Academic Year: 2019-20

**Semester-I FINAL ROLL
CALL LIST**

Roll No.	Name of Student
Batch B1	
1	Abhishek Vyankatesh Kompelli
2	Advait Pravin Bhadane
3	Akanksha Vanaji Dhamane
4	Akash Jitendra Shimpi
5	Akash Narayan Jagtap
6	Aman Agarwal
7	Arondekar Siddhesh Savalaram
8	Ashwini Nandkishor Juja
9	Ayush Sureka
10	Ayush .
11	Bankar Aniket Shivaji
12	Bhagirath Yogeshwari
13	Bhavsar Nikita Vikas
14	Chaitrali Shatrughna Tatkare
15	Dandekar Jui Vilas
16	Deepali Arun Matkar
17	Deshpande Ajay Avinash
18	Dound Minakshi Pandharinath
19	Gaikwad Ganesh Laxmanrao
20	Gate Ajinkya Ashok
21	Ghute Gopal Prakashrao
22	Harshada Dattatraya Joshi
23	Hirapara Mohit Chandrakantabhai
24	Hrushikesh Sudhir Adya
25	Indrajeet Dilip Diwane
26	Jui Avinash Pachupate
27	Kadam Aishwarya Gorakh
28	Kant Sinha Kumud
29	Kelkar Pramath Padmaparag
30	Khabiya Divya Alkesh

Roll No.	Name of Student
Batch B2	
31	Kijbile Shubham Dilip
32	Kokane Shubham Surendra
33	Kshatriya Shubham Sundarlal
34	Mahajan Himani Vilas
35	Manasi Ravindra Deshpande
36	Mandar Prakash Dandekar
37	Mhatre Prachi Rajendra
38	Neha Sanjay Kapre
39	Pallavi Babu Rathod
40	Pendse Ketki Anil
41	Piyush Shripad Avachat
42	Pranita Babarao Avachar
43	Pratik Sharad Rajpure
44	Pratiksha Satish Karne
45	Puranik Anand Kalidasrao
46	Rakshanda Deepak Sonaje
47	Rathod Shivam Ramnathrao
48	Rujuta Rahul Patankar
49	Sadichha Gajanan Padmawar
50	Saee Narsinh Deshpande
51	Samruddhi Chandrakant Chavan
52	Sanika Rajendra Sheth
53	Sanket Rajiv Shah
54	Shreya Shamkant Wani
55	Shubham Ghanshyam Marne
56	Sonal Sainath Nalbalwar
57	Sushma Chandrakant Kanshette
58	Swapnil Laxman Madane
59	Taklikar Sumeet Subhash
60	Tejal Ganesh Kahane
61	Tejaswini Balkrishna Mane

Roll No.	Name of Student
Batch B2	
62	Uday Chandrashekhar Kadam
63	Vijay Shravan Nikam
64	Vrushali Somnath Gavanang
65	Wagh Shivani Pramod
66	Yash Kumar Verma
67	Yasmin Laismohammad Choudhary
68	Kaneria Riya Mahendra
69	Hirapara Nikunj Ashokbhai
70	Gaikwad Kadambari Navnath
71	Yugandhara Sanjay Mahajan
72	Tejaswini Sandeep Marathe
73	Paste Rushikesh Narayan
74	Kamble Sahil Suhas
75	Singh Aman Ashwin
76	Joshi Amit Manohar
77	Ghankutkar Rohit Ratnakar
78	Lokhande Mahendra Rajendra
79	Taur Nikhil Mohan
80	Chatare Aditya Sanjay
81	Kalyankar Jay Rajendra
82	Dhameja Rahul Rajkumar
83	Chumble Chetan Sanjay
84	Swami Swastid Subhash
85	Kale Mahesh Anil
86	Valkunde Amar Bhimrao
87	Mokal Vishal Anant
88	Lole Sayali Bandopant
89	Abhishek Ruikar
90	Nisar Ahmed

Sinhgad Technical Education Society's RMD
SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE

DEPARTMENT OF INFORMATION TECHNOLOGY

List of Faculty Members SEM – I (A. Y. 2019-2020)

Sr. No.	Name of Faculty	Designation	Contact Details	
			Email Id	Mobile No.
1	Ms. Sweta Kale	Asst. Professor & HOD	ithod.rmdssoe@sinhgad.edu	9730007797
2	Mr. D.A. Meshram	Asst. Professor	dameshram@sinhgad.edu	9405134826
3	Ms. Pratibha P. Chavan	Asst. Professor	pratibha.chavan@sinhgad.edu	9011671018
4	Ms. Suvarna Potdukhe	Asst. Professor	suvarna.potdukhe.rmdssoe@sinhgad.edu	9850844224
5	Mr. Suhas B. Chavan	Asst. Professor	suhas.chavan@sinhgad.edu	9766231286
6	Mrs. Prajakta Kulkarni	Asst. Professor	Prajakta.Kulkarni@sinhgad.edu	9527206569
7	Ms. Kaveri Chaudhari	Asst. Professor	kaverisonawane28@gmail.com	8087929815
8	Ms. Gauri Patil	Asst. Professor	gauripatil.rmdssoe@sinhgad.edu	7028388487
9	Ms. Jaitee Bnkar	Asst. Professor	jaiteebankar.rmdssoe@sinhgad.edu	9011841626
10	Ms. Varsha Abhang	Asst. Professor	abhangvarsha123@gmail.com	9665586187

Mrs. Sweta Kale
(HOD IT)

Sinhgad Technical Education Society's RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE

DEPARTMENT OF INFORMATION TECHNOLOGY

Class Teachers SEM – I (A. Y. 2019-2020)

Class	Name of Class Teacher	Mobile No.	Email Id
SE	Ms. Pratibha P. Chavan	9011671018	pratibha.chavan@sinhgad.edu
TE	Mr. D. A. Meshram	9405134826	dameshram@sinhgad.edu
BE	Ms. Suvarna Potdukhe	9850844224	suvarna.potdukhe.rmdssoe@sinhgad.edu

Teacher Guardian Faculty Members SEM – I (A. Y. 2019-2020)

Class	Batch	Name of Teacher Guardian	Mobile No.	Email Id
SE	S1	Ms. Pratibha P. Chavan	9011671018	pratibha.chavan@sinhgad.edu
	S2	Ms. Varsha Abhang	9665586187	abhangvarsha123@gmail.com
	S3	Ms. Jaitee Bankar	9011841626	jaiteebankar.rmdssoe@sinhgad.edu
TE	T1	Mr. D. A. Meshram	9405134826	dameshram@sinhgad.edu
	T2	Mrs. Prajakta Kulkarni	9527206569	Prajakta.Kulkarni@sinhgad.edu
	T3	Mr. Suhas B. Chavan	9766231286	suhas.chavan@sinhgad.edu
BE	B1	Ms. Suvarna Potdukhe	9527206569	Prajakta.Kulkarni@sinhgad.edu
	B2	Ms. Kaveri Chaudhari	8087929815	kaverisonawane28@gmail.com
	B3	Ms. Gauri Patil	7028388487	gauripatil.rmdssoe@sinhgad.edu

Mrs. Sweta Kale
(HOD IT)

Sinhgad Technical Education Society's
RMD SINHGAD SCHOOL OF ENGINEERING, PUNE-58
 Department of Information Technology

A.Y. 2019-20 Sem: I **Class: BE** W.E.F.: 15/6/1

PR Batch B1: 1 to 23 PR Batch B2: 24 to 46
 PR Batch B3: 47 to 71

Class Teacher : Sheetal Patil
 TG: SP|AK |SC

TIME TABLE

<u>TIME</u>	<u>MONDAY</u>	<u>TUESDAY</u>	<u>WEDNESDAY</u>	<u>THURSDAY</u>	<u>FRIDAY</u>
08.30 – 09.30	SDM	SDM	Elective-II	Elective - I	Project Day
09.30 – 10.30	Elective - I	ML	ICS	SDM	
10.30 – 10.45	SHORT RECESS				
10.45 – 11.45	B1: CL-VII(PSK-505) B2: CL-VII(KC-520)	B1: CL-VIII (SRK -520) B2: CL-VIII (SDP-521)	B1: CL-VIII (SDP -521) B2: CL-VIII (SRK-505)	B1:CL-VII(KC-520) B2: CL-VII(PSK-505)	Project Day
11.45 – 12.45	B3: CL-VIII (SRK -521)	B3: CL-VII(PSK-505)	B3: CL-VII(KC-520)	B3: CL-VIII (SDP-521)	
12.45 – 01.30	LONG RECESS				
01.30 – 02.30	Elective-II	Elective - I	Elective-II	ICS	Project Day
02.30 – 03.30	ML	ICS	ML	Elective-II	
03.30 – 04.30	ICS	ML	SDM	ML/ Elective - I	

Theory Subject	Faculty
Information and Cyber Security	Ms. Prajakta Kulkarni
Software Design and Modeling	Ms. Suvarna Potdukhe
Machine Learning and Applications	Ms. Kaveri Chaudhari
Elective – I (Business Analytics and Intelligence)	Ms. Sweta Kale
Elective – II (Software Testing and Quality Assurance)	Ms. Gauri Patil

Faculty	Practical Batches
Ms. Prajakta Kulkarni	CL-VII: B1,B2,B3(505)
Ms. Suvarna Potdukhe	CL-VIII: B1, B2,B3(521)
Ms. Kaveri Chaudhari	CL-VII: B1,B2,B3(520)
Ms. Sweta Kale	CL-VIII: B1,B2, B3,

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Ms.Prajakta Kulkarni
Co-ordinator

Mrs. Sweta Kale
Head of Department

CREDIT SYSTEM : ODD SEMESTER

GRADE	OE + TH	SEM I Subjects		In-Sem & End-Sem			Other Scheme			Example			Example	
		Name of Subject	Subject Code	IS(TH)	ES(TH)	IS + ES	TW	PR	OR	TOT %	Crd	Grd	Grd Pts.	Crd Pts.
O	80 - 100													
A+	70 - 79	ICS	414453	20/30	48/70	68/100	---	---	---	68	3	A	8	24
A	60 - 69	MLA	414454	15/30	55/70	70/100	---	---	---	70	4	A+	9	36
B+	55 - 59	SDM	414455	19/30	65/70	84/100	---	---	---	84	3	O	10	30
B	50 - 54	EL I	414456	21/30	60/70	81/100	---	---	---	81	3	O	10	30
C	45 - 49	EL II	414457	23/30	45/70	68/100	---	---	---	68	3	A	8	24
P	40 - 44	CL VII	414458	---	---	---	40/50	30/50	---	70	2	A+	9	18
C	0 - 39	CL VIII	414459	---	---	---	45/50	---	38/50	83	2	O	10	20
		Project Phase I	414460	---	---	---		---	40/50	80	2	O	10	20
GRADE	Grade Pts.	Audit Course V	414461	---	---	---	---	---	---	---	---	O	---	---
O	10										22			
A+	9													
A	8													
B+	7													
B	6													
C	5													
P	4													
F	0													

SGPA =	202/22	9.181
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Credit Earn	22
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SGPA =	Total No. of Credit Point
	Total No. of Credit

SGPA	Semester Grade Point Average
CGPA	Cumulative Grade Point Average

414453: INFORMATION AND CYBER SECURITY

Teaching Scheme:
TH:03 Hours/Week

Credits: 03

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

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. Use basic cryptographic techniques in application development.
2. Apply methods for authentication, access control, intrusion detection and prevention.
3. To apply the scientific method to digital forensics and perform forensic investigations.
4. To develop computer forensics awareness.
5. Ability to use computer forensics tools.

UNIT I SECURITY BASICS

7 Hrs

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

7Hrs

Introduction, Classical Encryption Techniques, Block Ciphers and Data Encryption standards, Advanced Encryption standard, Public Key Cryptography and RSA, Chinese Remainder Theorem, Diffie-Hellman, Elgamal Curve Arithmetic, Elliptic Curve Arithmetic, Elliptic Curve Cryptography.

UNIT III DATA INTEGRITY ALGORITHMS AND SECURITY REQUIREMENTS

7 Hrs

Cryptographic Hash Functions, requirements and security, SHA-1, 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 Hrs

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 Hrs

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 Hrs

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.

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

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.

List of Laboratory Assignments:

- 1 Write program in C++ or Java to implement RSA algorithm for key generation and cipher verification.
- 2 Develop and program in C++ or Java based on number theory such as Chinese remainder.
- 3 Write a program in C++ or java to implement SHA1 algorithm using libraries (API).
- 4 Configure and demonstrate use of vulnerability assessment tool such as Snort tool for intrusion or SSL Web security.



Sinhgad Technical Education Society's
RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE

TEACHING PLAN

CLASS: BE ACADEMIC YEAR: 2019-2020

TERM: I

SUBJECT: INFORMATION AND CYBER SECURITY (Subject Code: 414453)

SUBJECT FACULTY: Prajakta Kulkarni

BRANCH: INFORMATION TECHNOLOGY

%SUBJECT RESULT FOR LAST THREE YEARS:

Lect. No.		Units	Planned Dates	Syllabus	Actual Dates	Topics & Contents Covered
UNIT I: SECURITY BASICS (7 Hrs)						
1	UNIT I	18/6/19	Information Security Concepts,			
2		19/6/19	Security Threats and Vulnerabilities,			
3		20/6/19	Security Architectures and Operational Models,			
4		25/6/19	Types of Security attacks, Goals of Security,			
5		26/6/19	Malicious code, Intrusion detection system (IDS): Need, Types,			
6		27/6/19	Limitations and Challenges,			
7		2/7/19	security and privacy.			
UNIT II: SYMMETRIC AND ASYMMETRIC KEY CRYPTOGRAPHY (7 Hrs)						
8	UNIT II	3/7/19	Introduction, Classical Encryption Techniques,			
9		4/7/19	Block Ciphers and Data Encryption standards,			
10		9/7/19	Advanced Encryption standard			
11		10/7/19	Public Key Cryptography and RSA,			
12		11/7/19	Chinese Remainder Theorem, Diffie-Hellman,			
13		12/7/19	Elgamal Curve Arithmetic, Elliptic Curve Arithmetic,			
14		16/7/19	Elliptic Curve Cryptography.			

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UNIT III: DATA INTEGRITY ALGORITHMS AND SECURITY REQUIREMENTS (7 Hrs)					
15	UNIT III	17/7/19	Cryptographic Hash Functions,		
16		18/7/19	requirements and security, SHA-1, SHA-3,		
17		23/7/19	Digital Signatures, X.509 Certificate,		
18		24/7/19	Kerberos, IP Security: Architecture Protocols IPv4,		
19		25/7/19	IPv6, AH, EPS, ISAKMP, Web Security: SSL,		
20		13/8/19	HTTPS, Mail Security: PGP,		
21		14/8/19	S/MIME		
UNIT IV: LEGAL, ETHICAL, AND PROFESSIONAL ISSUES IN INFORMATION SECURITY, RISK MANAGEMENT (7 Hrs)					
22	UNIT IV	15/8/19	Overview, Risk identification, Risk Assessment,		
23		20/8/19	Risk Control Strategies, Quantitative vs.		
24		21/8/19	Qualitative Risk Control Practices.		
25		22/8/19	Risk Management.		
26		27/8/19	Laws and Ethics in Information Security,		
27		28/8/19	Codes of Ethics,		
28		29/8/19	Protecting programs and data.		
UNIT V: INTRODUCTION TO CYBER LAWS (7 Hrs)					
29	UNIT V	3/9/19	Introduction, Definition and origin,		
30		4/9/19	Cybercrime and Information security,		
31		5/9/19	Classification of Cybercrimes, The legal perspectives- Indian perspective,		
32		6/9/19	Global perspective, Categories of Cybercrime,		

33		9/9/19	Types of Attacks, a Social Engineering,		
34		10/9/19	Cyber stalking,		
35		11/9/19	Cloud Computing and Cybercrime.		
UNIT VI: TOOLS AND METHODS USED IN CYBERCRIME (7 Hrs)					
36	UNIT VI	17/9/19	Introduction, Proxy servers and Anonymizers,		
37		18/9/19	Phishing, Password Cracking, Key-loggers and Spywares,		
38		19/9/19	Types of Virus, Worms, Dos and DDoS, SQL injection,		
39		24/9/19	Cybercrime and Legal perspectives, Cyber laws- Indian context,		
40		25/9/19	The Indian IT Act-Challenges, Amendments, Challenges to Indian Law and cybercrime Scenario in India,		
41		26/9/19	Indian IT Act and Digital Signatures. study of any two network security scanners:		
42		27/9/19	Nmap, Metasploit, OpenVAS, Aircrack, Snort, Wireshark, Nikito, Samurai, Safe 3 etc.		

100% Syllabus Coverage.

Mrs. Prajakta Kulkarni
Subject In-charge

Prof. Sweta Kale
HOD (IT)

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UNITWISE QUESTION BANK

Subject: INFORMATION AND CYBER SECURITY

UNIT - I: SECURITY BASICS

- Q.1** Difference :
- i) Passive Attacks and Active Attacks
 - ii) Authentication and Authorization
- Q.2** State Chinese Remainder theorem with example
- Q.3** Calculate Cipher text using RSA algorithm. Given data as follows: prime numbers P and Q as 13,17 and the plain text to be sent is 12. Assume public key (e) as 19.
- Q.4** State and prove Fermat's Theorem.
- Q.5** Explain following terms with example
- i) Confusion and Diffusion
 - ii) Secret Splitting and Secret Sharing
- Q.6** Describe the modes of operation (ECB, CBC, CFB, OFB) with the help of block diagram
- Q.7** Explain Fermat's little theorem and solve the following using the same: i)
- $15^{18} \bmod 17$
- ii) $5^{27} \bmod 13$
- Q.8** Using Euclidean algorithm calculate GCD(48,30) and GCD(105,80)
- Q.9** Explain Principles of Security
- Q.10** Describe the advantages and disadvantages of symmetric and asymmetric key cryptography
- Q.11** State the Euclids algorithm with example
- Q.12** State and prove Fermat's theorem

UNIT II: SYMMETRIC AND ASYMMETRIC KEY CRYPTOGRAPHY

- Q.1** Explain Data Encryption Standard (DES) symmetric cryptographic algorithm with different modes of operation
- Q.2** Draw AES block diagram and explain the steps in detail.
- Q.3** Explain Public Key Infrastructure (PKI) X.509 with the help of architectural block diagram
- Q.4** Discuss and Compare linear cryptanalysis and differential cryptanalysis
- Q.5** Explain Key Distribution scenario using private key algorithm
- Q.6** Explain sequence diagram of Neeham Schroeder protocol and explain with sequence diagram
- Q.7** In a public key cryptosystem using RSA you intercept the cipher text $C=284$ sent to user whose public key is $e=223$ and $n=713$. What is the plain text M ?
- Q.8** In a public key cryptosystem using RSA given $N=187$ and the encryption key (E) as 17, find out corresponding private key (D)
- Q.9** What is the difference between block and stream cipher
- Q.10** What is mean by Modular arithmetic and Exponentiation
- Q.11** What are the possible attacks on DES

UNIT III: DATA INTEGRITY ALGORITHMS AND SECURITY REQUIREMENTS

- Q.1** Discuss Key Management with respect to following issues
- i) Key Generation
 - ii) Key Distribution
 - iii) Key Updation
- Q.2** What is man-in-middle- attack? Explain with example the Diffie-Hellman Key exchange algorithm.
- Q.3** What are the key requirements of message digest and why SHA is more secure than MD5
- Q.4** Explain one way and mutual authentication.
- Q.5** How the Digital Certificate creation takes place? Enlist the contents of Digital Certificate.
- Q.6** What is Digital Signature? Explain steps to create Digital Signature. (/Using Digital Signature Algorithm DSA)
- Q.7** What problem was Kerberos designed to address. Describe Kerberos Realm
- Q.8** Draw block diagram of SHA-1 and state the general step in the process
- Q.9** List the certifying authorities in India and worldwide. Also list the steps to acquire the digital certificate
- Q.10** What is PKI? Explain the different PKI architectures

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

- Q.1** Explain SSL hand shake and SSL Record protocol in detail with neat sketch
- Q.2** List the benefits of IPSec. Distinguish between tunnel and transport mode in IPSec
- Q.3** Define IKE protocol and illustrate IKE format in detail
- Q.4** Explain various categories of Illusion Detection System (IDS)
- Q.5** How AH and ESP differs while working under transport and tunnel mode
- Q.6** Discuss SSL with respect to four phases
- i) Establish security capabilities
 - ii) Server authentication and key exchange
 - iii) Client authentication and key exchange
 - iv) Finish
- Q.7** What is the purpose of the SSL record layer protocol and handshake protocol
- Q.8** Difference between
- i) HIDS and NIDS
 - ii) IDS and IPS

UNIT V: INTRODUCTION TO CYBER LAWS

- Q.1** Describe the Indian and global legal perspective on cyber crime
- Q.2** Explain types of cyber crime in detail.
- Q.3** What is cyber stalking? Types of stalkers (online and offline)
- Q.4** Define cyber security and information security with example
- Q.5** Explain with example how social engineering is playing wide role in cyber crime
- Q.6** Write short note on Indian legal perspective
- Q.7** Describe the classification of the cyber crime
- Q.8** Explain what are the different attacks launched with attack vector

UNIT VI: TOOLS AND METHODS USED IN CYBERCRIME

- Q.1** What is the difference between proxy server and an anonymizers
- Q.2** Explain phishing and password cracking
- Q.3** Write short note on the following
- i) Key loggers and Spywares
 - ii) Indian IT act and its challenges
 - iii) SQL injection and Digital signatures
- Q.4** Define and differentiate
- i) Proxy server and anonymizer
 - ii) DOS and DDOS
 - iii) Virus and worm
- Q.5** What is SQL injection? Explain in detail
- Q.6** Write short note on
- i) Indian IT act
 - ii) Different ways of password cracking



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Mid prelim (AY: 2019-20)

Subject: INFORMATION AND CYBER SECURITY (Set A)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) Give the types of attacks with examples [5]
b) Difference between IDS and IPS [5]

OR

- Q.2 a) In public key cryptosystem using RSA, given $N=187$ and the encryption key (E) as 17, find out the corresponding private key (D) [5]
b) Explain passive and active attack in detail [3]
c) Explain Chinese reminder theorem in detail. [2]

- Q.3 a) In CFB mode, how many blocks are affected by a single bit error in transmission. [5]
b) distinguish between substitution and transposition cipher [5]

OR

- Q.4 a) Explain the terms with example confusion and diffusion [5]
b) Write down the purpose of S box in DES [5]
- Q.5 a) Compare and contrast MD5 and SHA1. [5]
b) What characteristics are needed in a secure hash function [5]

OR

- What protocol comprise SSL? What is difference between SSL connection and SSL session? [5]
- Q.6 a) [5]
b) Write short note on HTTPS [5]



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Mid prelim (AY: 2019-20)

Subject: INFORMATION AND CYBER SECURITY (Set B)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) Give the types of attacks with examples [5]
b) plain different IDS methods with one example each [5]

OR

- Q.2 a) Write short note on intrusion detection and Prevention [5]
b) Explain passive and active attack in detail [5]

- Q.3 a) Perform encryption and decryption using RSA algorithm. $P=7, q=11, e=17, M=8$ [5]

- b) plain the terms with example confusion and diffusion [5]

OR

- Q.4 a) What is double DES? What kind of attack on double DES makes it useless ? [5]

- b) Explain symmetric and asymmetric key cryptography [5]

- Q.5 a) What is Kerberos? [5]

- b) Explain one way and mutual authentication [5]

OR

- Q.6 a) Explain X.509 standard for digital certificate [5]

- Describe briefly how IPSec works and enlist its applications? Distinguish
b) between tunnel and transport mode of IPSec [5]



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Prelim (AY: 2019-20)

Subject: INFORMATION AND CYBER SECURITY (Set A)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a)** Explain different IDS methods with one example [5]
b) What are the key requirement of message digest and why SHA is more secure than MD5 [5]

OR

- Q.2 a)** Perform encryption decryption using RSA algorithm. $P=7, q=11, e=17$ and $M=8$ [5]
b) Consider the following threats to web security and describe how each is countered by particular feature of SSL.
i. Brute force ii. Known plain text attack iii. Replay attack iv. Man-in-the-middle attack v. Password sniffing vi. IP Spoofing IP Hijacking viii. SYN flooding [5]

- Q.3 a)** Give the types of attacks with example [5]
b) Write short note on logic bomb, Trojan horse, virus and worms [5]

OR

- Q.4 a)** In CFB mode how many blocks are affected by a single bit error in transmission [5]
b) Illustrate the Diffie-Hellman key exchange protocol [5]

- Q.5 a)** Write short note on risk management [8]
b) What is cost benefit analysis [8]

OR

- Q.6 a)** Write short note on risk identification [8]
b) Explain risk control strategies [8]

- Q.7 a)** Define cyber security and information security with example. [8]
b) Explain with example how social engineering is playing wide role in cyber crime [4]
c) Classify and explain cybercrimes against property [4]

OR

- Q.8 a)** Address security issues in cloud computing [8]
b) Write short note on software privacy [4]
c) Write short note on Indian legal perspective [4]

- Q.9 a)** Define and differentiate proxy server and an anonymizer. [8]

- b) Explain trap-door-one way function with example [8]
- c) Write short note on DOS and DDOS attacks [2]

OR

- Q10.a) Write short note on virus and worms [8]
- b) Write short note on key loggers and spywares [8]
- c) What is the difference between proxy servers and an anonymizers? [2]



Sinhgad Technical Education Society's
RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE

Prelim (AY: 2019-20)

Subject: INFORMATION AND CYBER SECURITY (Set B)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) Perform encryption decryption using RSA algorithm. $P=7, q=11, e=17$ and $M=8$ [5]
b) Consider the following threats to web security and describe how each is countered by particular feature of SSL.

i. Brute force ii. Known plain text attack iii. Replay attack iv. Man-in-the-middle attack v. Password sniffing vi. IP Spoofing IP Hijacking viii. SYN flooding [5]

OR

- Q.2 a) Explain different IDS methods with one example [5]
b) What are the key requirements of message digest and why SHA is more secure than MD5 [5]

- Q.3 a) In CFB mode how many blocks are affected by a single bit error in transmission [5]

- b) Illustrate the Diffie-Hellman key exchange protocol [5]

OR

- Q.4 a) Give the types of attacks with example [5]
b) Write short note on logic bomb, Trojan horse, virus and worms [5]

- Q.5 a) Differentiate qualitative and quantitative risk analysis [8]
b) Write short note on code of Ethics. [8]

OR

- Q.6 a) What is cost benefit analysis [8]
b) Write short note on risk management [8]

- Q.7 a) Explain the types of cyber crime in detail [8]
b) Write short note on Botnets [4]
c) Classify and explain cybercrimes against property [4]

OR

- Q.8 a) Describe the classification of cyber crime [8]
b) Write short note on Indian legal perspective [4]
c) Write note on : software privacy [4]
Q.9 a) Write short note on DOS and DDOS attacks [8]

- b) Write short note on SQL injection [8]
- c) Explain trap-door-one way function with example [2]

- Q10a) What is the difference between proxy servers and an anonymizers? [8]
- b) Write short note on phishing [8]
 - c) Write short note on virus and worms [2]

414454: MACHINE LEARNING AND APPLICATIONS

Teaching Scheme:
TH:04 Hours/Week

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.

List of Laboratory Assignments:

1. Study of platform for Implementation of Assignments. Download the open source software of your interest. Document the distinct features and functionality of the software platform. You may choose WEKA and R and Python.
2. Supervised Learning - Regression (Using R)
Generate a proper 2-D data set of N points. Split the data set into Training Data set and Test Data set. i) Perform linear regression analysis with Least Squares Method. ii) Plot the graphs for Training MSE and Test MSE and comment on Curve Fitting and Generalization Error. iii) Verify the Effect of Data Set Size and Bias-Variance Tradeoff. iv) Apply Cross Validation and plot the graphs for errors. v) Apply Subset Selection Method and plot the graphs for errors. vi) Describe your findings in each case.
3. Create Association Rules for the Market Basket Analysis for the given Threshold. (Using R).
4. Implement K-Means algorithm for clustering to create a Cluster on the given data.(Using Python).
5. Implement SVM for performing classification and find its accuracy on the given data. (Using Python).
6. On the given data perform the performance measurements using Simple Naïve Bayes algorithm such as Accuracy, Error rate, precision, Recall, TPR, FPR,TNR,FPR etc. (Using Weka API through JAVA).



Sinhgad Technical Education Society's
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TEACHING PLAN

CLASS: BE **ACADEMIC YEAR:** 2019 - 2020

TERM: I

SUBJECT: MACHINE LEARNING AND APPLICATION (Subject Code: 414454)

SUBJECT FACULTY: Kaveri Sonawane

BRANCH: INFORMATION TECHNOLOGY

%SUBJECT RESULT FOR LAST THREE YEARS:

Lect. No.	Units	Planned Dates	Planned Topics & Contents	Actual Dates	Topics & Contents Covered
UNIT I : INTRODUCTION TO MACHINE LEARNING (8 Hrs)					
1	UNIT I	17/06/19	Introduction to Machine Learning, What is Machine Learning,		
2		18/06/19	Examples of Machine Learning applications		
3		19/06/19	Training versus Testing, Positive and Negative Class, Cross-validation.		
4		20/06/19	Types of Learning: Supervised, Unsupervised		
5		24/06/19	and Semi-Supervised Learning.		
6		25/06/19	Dimensionality Reduction: Introduction to Dimensionality Reduction		
7		26/06/19	Subset Selection		
8		27/06/19	Introduction to Principal Component Analysis.		
UNIT II : CLASSIFICATION (8 Hrs)					
9	UNIT II	1/07/19	Classification, Binary and Multiclass Classification		
10		02/7/19	Assessing Classification Performance,		
11		03/07/19	Handling more than two classes		
12		4/07/19	Multiclass Classification-One vs One, One vs Rest Linear Models		
13		8/07/19	Linear Models Perceptron,		
14		9/7/19	Support Vector Machines (SVM)		
15		10/7/19	Soft Margin SVM		
16		11/7/2019	Kernel methods for non-linearity		
UNIT III : REGRESSION AND GENERALIZATION (8 Hrs)					
Signature Not Verified BEHAV THALRAO DIXIT	UNIT III	15/7/2019	Regression: What is Regression, Assessing performance of Regression – Error measures		

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18		16/7/2019	Overfitting and Underfitting,		
19		17/7/2019	Catalysts for Overfitting, VC Dimensions		

20		22/7/2019	Linear Models: Least Square method, Univariate Regression, Multivariate Linear Regression		
21		23/7/2019	Multivariate Linear Regression, Regularized Regression -		
22		24/7/2019	Ridge Regression and Lasso		
23		13/8/2019	Theory of Generalization: Bias and Variance Dilemma, Training and Testing Curves		
24		14/8/2019	Case Study of Polynomial Curve Fitting.		

UNIT IV : LOGIC BASED AND ALGEBRAIC MODELS (8 Hrs)

25	UNIT IV	19/8/2019	Distance Based Models: Neighbors and Examples		
26		20/8/2019	Nearest Neighbor Classification , Hierarchical clustering.		
27		21/8/2019	Distance based clustering algorithms - K-means and K-medoids		
28		26/8/2019	Rule Based Models: Rule learning for subgroup discovery		
29		27/8/2019	Association rules mining – Apriori Algorithm,		
30		28/8/2019	Confidence and Support parameters		
31		30/8/2019	Tree Based Models: Decision Trees, Minority Class		
32		3/9/2019	Impurity Measures – Gini Index and Entropy, Best Split.		

UNIT V : PROBABILISTIC MODELS (8 Hrs)

33	UNIT V	4/9/2019	Conditional Probability		
34		5/9/2019	Joint Probability		
35		6/9/2019	Probability Density Function		
36		9/9/2019	Normal Distribution and its Geometric Interpretation		
		11/9/2019	Naïve Bayes Classifier		

38		12/9/2019	Discriminative Learning with Maximum Likelihood		
39		13/09/2019	Probabilistic Models with Hidden variables: Expectation-Maximization methods		
40		20/09/2019	Gaussian Mixtures		
UNIT VI : TRENDS IN MACHINE LEARNING (8 Hrs)					
41	UNIT VI	16/9/2019	Ensemble Learning: Combining Multiple Models		
42		17/9/2019	Bagging, Randomization		
43		18/9/2019	Boosting, Stacking		
44		23/9/2019	Reinforcement Learning: Exploration		
45		25/9/2019	Exploitation, Rewards, Penalties		
46		30/9/2019	Deep Learning: The Neuron, Expressing Linear Perceptron as Neurons		
47		1/10/2019	Feed Forward Neural Networks, Linear Neurons and their Limitations		
48		3/10/2019	Sigmoid, Tanh and ReLU Neurons		

100% Syllabus Coverage.

Mrs. Kaveri Chaudhari
Subject In-charge

Prof. Sweta Kale
HOD (IT)

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UNITWISE QUESTION BANK

Subject: MACHINE LEARNING AND APPLICATION

UNIT I: INTRODUCTION TO MACHINE LEARNING

- Q.1 What is Machine Learning? What is the need of Machine Learning? Explain examples of Machine Learning Problems?
Explain in detail Structure of Learning.
- Q.2 Explain in detail Predictive and Descriptive tasks of Machine Learning?
- Q.3 What are features and feature types? Explain Feature Selection Process.
- Q.4 Explain Feature Construction and Feature Transformation with example.
- Q.5 Explain characteristics of Machine Learning Tasks.
- Q.6 Write a short note on:
- Q.7 Geometric Model Vs. Logical Model
Probabilistic Model
Designing Vs. Learning
Training Vs. Testing
Mention the difference between Data Mining and Machine learning?
- Q.8
- Q.9 What are the stages to build the hypotheses or model in machine learning?
- Q. 10 What is 'Training set' and 'Test set'?
- Q. 11 What are the different Algorithm techniques in Machine Learning? Explain it
- Q. 12 Explain Supervised Learning.
Write a short note on
Classification
- Q.13

Regression

Clustering

Subset selection

Q.14 List down various approaches for machine learning?

Q.15 List the applications of supervised learning.

UNIT II: CLASSIFICATION

- Q.1 Explain kernel methods for non-linearity.
- Q.2 Write an algorithm for Support Vector Machine.
- Q.3 Explain True Positives, True Negatives False Positives, False Negatives and class ratio.
- Q.4 What are the measures for evaluating classification performance, explain any two in brief?
- Q.5 What is one-versus-all Versus all-versus-all?
- Q.6 Write an algorithm for linear classification perceptron?
- Q.7 Explain soft margin SVM with example.
- Q.8 State the primal form and dual form of perceptron of Support Vector Machine.

UNIT III: REGRESSION AND GENERALIZATION

- Q.1 Explain ridge regression and lasso.
- Q.2 Explain the term bias-dilemma.
- Q.3 Explain in brief logistic regression. Compare simple regression and logistic regression.
- Q.4 What are the different types of regularizes?
- Q.5 Explain the difference between ridge regression and lasso?
- Q.6 What is generalization?
- Q.7 Explain different measures for assessing error in regression.
1) SSE 2) MSE 3) RMSE 4) Goodness-fit 5) Bias 6) Variance
- Q. 8 Explain Overfitting and Under fitting?
- Q.9 What do you mean by zero-centering?

UNIT IV: LOGIC BASED AND ALGEBRAIC MODELS

- Q.1 Explain silhouettes.
- Q.2 What is subgroup discovery?
- Q.3 Explain with the help of diagram an expression Minkowski, Euclidean, Manhattan and Hamming Distance.
- Q.4 Explain Four Distance Functions.
- Q.5 What is an algorithm for K means Clustering, describe its working in brief using example.
- Q.6 Give Steps to calculate Entropy of a split.
- Q.7 Find all association rules in the following database with minimum Support = 2, minimum confidence=70%.

TID	Items
1	{a,b,c}
2	{b,c,d,e}
3	{c,d}
4	{a,b,d}
5	{a,b,c}

- Q.8 Using the following data, find 2-item-itemsets which have minimum support = 2.

Transaction	Items
1	nappies
2	beer, crisps
3	apples, nappies
4	beer, crisps, nappies
5	apples
6	apples, beer, crisps, nappies
7	apples, crisps
8	crisps

- Q.9 Find all 3 -item item sets from this set with minimum support=2.

Trans_id	Item list
T1	{K, A, D, B}
T2	{D, A, C, E, B}
T3	{C, A, B, E}
T4	{B, A, D}

UNIT V: PROBABILISTIC MODELS

- Q.1 Write a note on normal distribution.
- Q.2 What is multivariate Bernoulli distribution?
- Q.3 Define.
- i) Bernoulli's distribution.
 - ii) Binomial distribution.
 - iii) MAP decision rule.
 - iv) Maximum likelihood function.
- Q.4 Distinguish between discriminative model and generative learning model with suitable example.
- Q.5 Write a note on compression based models.
- Q.6 Explain discriminative learning.
- Q. 7 Define the term Gaussian distribution.
- Q.8 Explain one dimensional and N-dimensional Gaussian Mixture Model.

Unit VI: TRENDS IN MACHINE LEARNING

- Q.1 Explain multi task learning.
- Q.2 Explain the concept of penalty and award in reinforcement learning.
- Q.3 Explain discriminative learning.
- Q.4 Write a note on sequence prediction.
- Q.5 Explain bagging in ensemble learning.
- Q.6 Explain boosting in ensemble learning.
- Q.7 What is motivation behind reinforcement learning? Explain it with diagram stating its important entities.
- Q.8 Explain concept of rewards and penalties in reinforcement learning.



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Mid prelim (AY: 2019-20)

Subject: MACHINE LEARNING AND APPLICATIONS (Set A)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

Q.1 a) What is machine learning ? Give an overview of machine learning with suitable diagram. [5]

b) What is a perceptron? Explain with the help of an example. [5]

OR

Calculate accuracy, precision and recall for the following:

Q.2 a) [5]

	Predicted+	Predicted-
Actual+	60	15
Actual-	10	15

b) With an example explain feature as a split and feature as a predictor. [5]

Q.3 a) Derive and explain output code matrix for One Vs One and One Vs Rest Scheme for construction of Multi class classifier (for 3 classes). [5]

b) Explain perceptron [5]

OR

Q.4 a) Explain logical models. State examples [5]

b) What is the contingency table/confusion matrix? What is the use of it? [5]

Q.5 a) Explain True Positives, True Negatives False Positives, False Negatives and class ratio [5]

b) What is multivariate regression? How will it be different from univariate regression? [5]

OR

Q.6 a) Explain the difference between ridge regression and lasso [5]

b) Explain VC dimension [5]



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Mid prelim (AY: 2019-20)

Subject: MACHINE LEARNING AND APPLICATIONS (Set B)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

Q.1 a) Explain the role of training data set, testing data set and validation data set with suitable example. **[06]**

Q.1 b) Discuss machine learning applications in the following areas: **[04]**

- i. Biometrics
- ii. Medical diagnosis
- iii. Share market
- iv. Speech recognition

OR

Q.2a) Explain subset selection method for dimension reduction **[06]**

Q2b) Differentiate between supervised and unsupervised learning **[04]**

Q3a) Consider the following 3- class confusion matrix. **[06]**

Calculate precision and recall per class. Also calculate weighted average precision and recall for classifier.

Predicted			
Actual	15	2	3
	7	15	8
	2	3	45

Q.3b) Prove that: **[04]**

- i. $FPR = 1 - TNR$
- ii. $FNR = 1 - TPR$

OR

Q.4 a) Explain construction of multi-class classifier. **[06]**

- i. One vs All approach.
- ii. One vs One approach.
- iii. Error correcting output codes approach.

Q.4 b) Compare and contrast SVM and Perceptron. **[04]**

- Q.5 a)** Explain True Positives, True Negatives False Positives, False Negatives and class ratio. [06]
- Q.5 b)** What is multiple linear regression ? How will it be different from simple linear regression?s [04]

OR

- Q.6 a)** Consider the following data [06]
- Find the values of β_0 and β_1 w.r.t. linear Regression model which best fits given data.
 - Interpret and explain equation of regression line.
 - If new person rate “ Bahubali Part-I” as 3 then predict the rating of same person person for “ Bahubali-Part-II”

Person	X_i =rating for movie “ Bahubali Part-I” by i^{th} person	Y_i = rating for movie “ Bahubali Part-II” by i^{th} person
1	4	3
2	2	4
3	3	2
4	5	5
5	1	3
6	3	1

- Q.6 b)** Define Regularized Regression. What is the need of regularized Regression? [04]



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Prelim (AY: 2019-20)

Subject: MACHINE LEARNING AND APPLICATIONS (Set A)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

Q.1a) Explain with example k-fold cross validation. **[05]**

Q.1b) Write short note on Vapnik-Chervonenkis dimension **[05]**

OR

Q.2a) Explain two methods for reducing dimensionality. **[05]**

Q.2b) Write short note on Gram Matrix with an example. **[05]**

Q.3a) What are support vector margins and also explain soft margin. **[05]**

Q.3b) Explain the term bias-Variance dilemma **[05]**

OR

Q.4a) Explain Predictive and descriptive task. **[05]**

Q.4b) Explain Perceptron training algorithm for linear classification. **[05]**

Q.5a) Consider following five data points:

(0,3), (3,3) (3,0), (-2,-4) and (-4,-2)

Clusters are formed as follows:

Case1:

- A. First two points together in onecluster.
- B. Remaining three in another cluster.

Case 2:

- C. First three points together in one cluster.
- D. Remaining two in another cluster.

Find Out:

- i. Within-cluster scatters for both cases.
- ii. Between-cluster scatters for both cases.
- iii. Also comment which clustering produces tighter cluster whose centroids are further apart

[12]

- Q.5b)** Define and explain following terms.
- Minority Class
 - Gini Index.
 - Entropy.

[6]

OR

- Q.6a)** Find all association rules in the following database in the following database with minimum support = 2 and minimum confidence = 65%.

Transaction	Data Items
T1	Milk, bread, cornflakes
T1	Bread, jam
T1	Bread, Milk, cornflakes, jam
T1	Milk, cornflakes
T1	Bread, butter, jam
T1	Bread, butter
T1	Bread, Milk, butter

[10]

- Q.6b)** Consider following splits having four features

Length = [3,4,5]	[2+, 0-] [1+, 3-] [2+, 2-]
Gills = [Yes, No]	[0+, 4-] [5+, 1-]
Beak = [Yes, No]	[5+, 3-] [0+2-]
Teeth = [many, few]	[3+, 4-] [2+, 1-]

[8]

Find Total weighted Entropy & Gini-index of all Features.

- Q.7a)** Define Bayes Rule and solve following example.

Example: 5% of people in a city having cancer. In that city 10% people are smoker, Also 20% of people with cancer and smoker.

[8]

Find out the probability of people who are smoker possess cancer

OR

- Q.7b)** Define

- Bernoulli's distribution
- Binomial distribution.
- MAP decision rule
- Maximum likely hood function.

[8]

- Q.8a)** For the given dataset apply Naïve Bayes algorithm and predict the outcome for the car={Red, Domestic, SUV}.

[8]

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Domestic	Yes
Yellow	SUV	Domestic	No
Yellow	SUV	Domestic	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

Q.8.b) Write short note on GMM. [8]

Q.9a) Write short note on Feed - forward Neural Network. [8]

Q.9b) Write short note on Ensemble learning. [8]

OR

Q.10a) Explain why we use non-linearity function? States & explain 3 types of neurons that add non-linearity in their computations. [8]

Q.10b) Write short note on Reinforcement learning. [8]



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Prelim (AY: 2019-20)

Subject: MACHINE LEARNING AND APPLICATIONS (Set B)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

Q.1a) Explain geometric model? [05]

Q.1b) Write short note on Vapnik - Chervonenkis dimension [05]

OR

Q.2a) Explain supervised learning and unsupervised learning. [05]

Q.2b) Write short note on Gram Matrix with an example. [05]

Q.3a) What is a contingency table/ confusion matrix? What is the use of it? [05]

Q.3b) Prove with example $FP = Neg-TN$ [05]

OR

Q.4a) Write output code matrix for one –versus-one symmetric case. Assume tree class. [05]

Q.4b) Explain Perceptron ? [05]

Q.5a) Consider following five data points:

(0,3), (3,3) (3,0), (-2,-4) and (-4,-2)

Clusters are formed as follows:

Case1:

E. First two points together in one cluster.

F. Remaining three in another cluster.

Case 2:

G. First three points together in one cluster.

H. Remaining two in another cluster.

Find Out:

- iv. Within-cluster scatters for both cases.
- v. Between-cluster scatters for both cases.
- vi. Also comment which clustering produces tighter cluster whose centroids are further apart

Q.5b) What is logistic regression? How its out performs basic linear classifier?

[6]

OR

Q.6a) Using the following data, find 2-item-itemsets which have minimum support = 2.

Transaction	Items
1	nappies
2	beer, crisps
3	apples, nappies
4	beer, crisps, nappies
5	apples
6	apples, beer, crisps, nappies
7	apples, crisps
8	crisps

[10]

Q.6b) Consider following splits having four features

Length = [3,4,5]	[2+,0-] [1+, 3-] [2+, 2-]
Gills = [Yes, No]	[0+, 4-] [5+, 1-]
Beak = [Yes, No]	[5+, 3-] [0+2-]
Teeth = [many, few]	[3+, 4-] [2+, 1-]

[8]

Find Total weighted Entropy & Gini-index of all Features.

Q.7a) Define Bayes Rule and solve following example.

Example: 5% of people in a city having cancer. In that city 10% people are smoker, Also 20% of people with cancer and smoker.

[8]

Find out the probability of people who are smoker possess cancer

Q.7b) Define

- v) Bernoulli's distribution
- vi) Binomial distribution.
- vii) MAP decision rule
- viii) Maximum likely hood function.

[8]

OR

Q.8a) For the given dataset apply Naïve Bayes algorithm and predict the outcome for the car={Red, Domestic, SUV}.

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Domestic	Yes
Yellow	SUV	Domestic	No
Yellow	SUV	Domestic	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

[8]

Q.8.b) Write short note on GMM.

[8]

Q.9a) For three classifiers i.e B=3 and Two classes explain Boosting in detail.

[8]

Q.9b) Justify suitability of deep learning for machine learning task (Human face detection)

[8]

OR

Q.10a) Explain why we use non-linearity function? States & explain 3 types of neurons that add non-linearity in their computations.

[8]

Q.10b) What is exploration – Exploitation Dilemma ? Explain in the context of reinforcement learning.

[8]

414455: SOFTWARE DESIGN AND MODELING

Teaching Scheme:
TH:03 Hours/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 behaviour 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, Constraint 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, and 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. AliBahrami, 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 a 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.

List of Laboratory Assignments:

- 1 Write Problem Statement for System / Project**
Identify Project of enough complexity, which has at least 4-5 major functionalities. Identify stakeholders, actors and write detail problem statement for your system.
- 2 Prepare Use Case Model**
Identify Major Use Cases, Identify actors.
Write Use Case specification for all major Use Cases. Draw detail Use Case Diagram using UML2.0 notations.
- 3 Prepare Activity Model**
Identify Activity states and Action states.
Draw Activity diagram with Swim lanes using UML2.0 Notations for major Use Cases
- 4 Prepare Analysis Model-Class Model**
Identify Analysis Classes and assign responsibilities.
Prepare Data Dictionary
- 5 Prepare a Design Model from Analysis Model**
Study in detail working of system/Project.
Identify Design classes/ Evolve Analysis Model. Use advanced relationships. Draw Design class Model using OCL and UML2.0 Notations.
Implement the design model with a suitable object-oriented language.
- 6 Prepare Sequence Model**
Identify at least 5 major scenarios (sequence flow) for your system.
Draw Sequence Diagram for every scenario by using advanced notations using UML2.0
Implement these scenarios by taking reference of design model implementation using suitable object- oriented language
- 7 Prepare a State Model**
Identify States and events for your system.
Study state transitions and identify Guard conditions. Draw State chart diagram with advanced UML 2 notations.
Implement the state model with a suitable object-oriented language
- 8 Identification and Implementation of GRASP pattern**
Apply any two GRASP pattern to refine the Design Model for a given problem description Using effective UML 2 diagrams and implement them with a suitable object oriented language
- 9 Identification and Implementation of GOF pattern**
Apply any two GOF pattern to refine Design Model for a given problem description Using effective UML 2 diagrams and implement them with a suitable object oriented language

TEACHING PLAN

CLASS: BE ACADEMIC YEAR: 2019 – 2020

TERM: I

SUBJECT: SOFTWARE DESIGN AND MODELING (414455)

SUBJECT FACULTY: Mrs. Suvarna Potdukhe

BRANCH: INFORMATION TECHNOLOGY

Lec t No.	Unit No	Planned Dates	Planned Topics & Contents	Actual Dates	Topics & Contents covered
UNIT I: OBJECT ORIENTED METHODOLOGIES, UML (7 Hrs)					
1	UNIT I	17/06/2019	Views of Software Developments: Traditional System Development Methodology and Object Oriented Analysis and Design, Importance Object –Orientation		
2		18/06/2019	Some of the object Oriented Methodology:- Object Oriented Design –Booch, Object Modeling Techniques – Rumbaugh, Object – Oriented Analysis - Cood Yourdon		
3		19/06/2019	Object – Oriented Software Engineering – Ivar Jacobson Unified Approach: Object Oriented Analysis		
4		20/06/2019	Object Oriented Design, Iterative Development & Continuous Testing, Modeling Based on UML, Layered Approach		
5		24/06/2019	Unified Modeling Language: Introduction to Modeling & UML,MDA,		
6		25/06/2019	UML Structure, UML Building Blocks ,UML Common Mechanisms		
7		26/06/2019	Introduction to all UML Diagram Notational Techniques, 4+1 View		
UNIT-II OBJECT ORIENTED ANALYSIS (7 Hrs)					
8	UNIT II	27/06/2019	Object Oriented Analysis Process		
9		01/07/2019	Use Case Modeling: Actor Identification, Actor Classification, Actor Generalization, Use Cases Identification, Communication		
10		02/07/2019	Uses/Include and Extend Associations, Writing a Formal Use Cases, Use Case realization		
11		03/07/2019	Domain / Class Modeling: Approaches For Identifying Classes (Noun-Phase Approach, Common Class Pattern Approach		
12		04/07/2019	Class Responsibilities Collaboration		

			Approach, Naming Classes		
13		08/07/2019	Class Associations and Identification of Associations, Generalization/ Specialization Relationship		
14		09/07/2019	Aggregation and Composition Relationships, Attributes and Methods Identification		
Unit III INTERACTION AND BEHAVIOR MODELING (7 Hrs)					
15	UNIT III	10/07/2019	Activity Diagram : Activity and Actions, Initial and Final Activity, Activity Edge, Decision and Merge Points		
16		11/07/2019	Fork and Join, Input and Output Pins, Activity Group, Activity Partitions, Constraints on Action, Swim Lanes		
17		15/07/2019	Sequence Diagram: Context, Objects and Roles, Links, Object Life Line		
18		16/07/2019	Message or stimulus ,Activation/Focus of Control, Modeling Interactions		
19		17/07/2019	Collaboration Diagram: Objects and Links, Messages and stimuli, Active Objects, Communication Diagram		
20		18/07/2019	Iteration Expression, Parallel Execution, Guard Expression, Timing Diagram		
21		22/07/2019	State Diagram: State Machine, Triggers and Ports, Transitions, Initial and Final State, Composite States, Submachine States		
UNIT – IV OBJECT ORIENTED DESIGN (7 Hrs)					
22	UNIT IV	23/07/2019	Object Oriented Design Process Designing Business Layer : Object Oriented Constraints Language (OCL)		
23		24/07/2019	Designing Business Classes : The Process, Designing Well Defined Class Visibility		
24		25/07/2019	Attribute Refinement, Method Design Using UML Activity Diagram, Packaging and Managing Classes		
25		13/08/2019	Designing Access Layer: Object Relational Systems, Object Relation Mapping, Table Class Mapping		
26		14/08/2019	Table – Inherited Classes Mapping, Designing the Access Layer Classes: The Process		
27		19/08/2019	Designing View Layer: View Layer Classes Design, Identifying View Classes by Analyzing Use Cases, Macro-Level Design Process and Prototyping the User Interface		
28		20/08/2019	Component and Deployment Design using Component and Deployment Diagram		
UNIT – V DESIGN PRINCIPLES AND PATTERNS					
29		21/08/2019	Introduction to Patterns		
30		22/08/2019	General Responsibility Assignment Software		

			Patterns (GRASP) : Introduction, Creator , Information Expert		
31		26/08/2019	Low coupling, Controller, High Cohesion, Polymorphism		
32		27/08/2019	Pure fabrication, Indirection, Protected Variations		
33	UNIT V	28/08/2019	Gang of Four (GoF): Introduction,		
34		29/08/2019	Categories of Patterns (Creational, Structural and Behavioral Patterns)		
35		03/09/2019	Singleton, Adapter, State, and Strategy		
UNIT - VI ARCHITECTURAL DESIGN (7 Hrs)					
36		04/09/2019	Overview of software Architecture		
37		05/09/2019	Designing Client / Server Software Architectures		
38	UNIT VI	09/09/2019	Designing Service Oriented Software Architectures		
39		10/09/2019	Designing Component Based Software Architectures		
40		11/09/2019	Designing Concurrent and Real-Time Software Architectures		
41		12/09/2019	Designing Product Line Architectures,		
42		16/09/2019	Related Case Studies		

100% Syllabus Coverage.

Mrs. Suvarna Potdukhe
Subject In-charge

Prof. Sweta Kale
HOD (IT)



Sinhgad Technical Education Society's
RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE

UNITWISE QUESTION BANK

Subject: SOFTWARE DESIGN AND MODELING

UNIT I: OBJECT ORIENTED METHODOLOGIES, UML

1. Briefly explain three building blocks of UML.
2. Explain unified approach of system development with respect to process and concept used in it.
3. Explain importance of Object –Orientation.
4. Explain Rumbaugh OMT Object model of bank system.
5. Explain OMT DFD of the ATM system using BOOCH methodology.
6. Explain processes and components of the unified approach.
7. Explain layered approach to software development.
8. Explain types of modeling and its advantages.
9. Explain following concepts with notation: class interface, Association, Qualifier, Multiplicity, OR association.
10. What is UML? Explain MDA model transformation chain.
11. Describe in brief micro and macro development process of Grady Booch.
12. Explain four common mechanism of UML.

UNIT-II: OBJECT ORIENTED ANALYSIS

1. Explain Object Oriented Analysis Process in unified approach with diagram
2. Draw use case of library system.
3. What are use case realization
4. Explain Class, Responsibilities and Collaboration process.
5. Explain A-PART-OF relationships.
6. Explain Attributes and Methods Identification.
7. Explain Generalization and Specialization Relationship.
8. Explain guidelines for naming classes.
9. Identify use cases for Bank ATM system.
10. Identify classes for Bank ATM system using noun phrase approach.
11. List and explain the elements of use case scenario.
12. Explain include and extend relationships in use cases.
13. Draw complete UML class diagram of bank ATM system.
14. How to identify attributes?
15. How to identify methods?
16. How to eliminate unnecessary association?
17. What is association?
18. How to identify super-sub relationships?

Unit III: INTERACTION AND BEHAVIOR MODELING

1. Draw notation of Start - end and Decisions.
2. Define a. Decision b. Guard condition.
3. Draw activity diagram for receiving product into warehouse.
4. Explain constraints on actions with pre post condition.
5. A customer decides to upgrade her PC and purchase a DVD player. She begins by calling the sales department of the PC vendor and they tell her to talk to customer support. She then calls customer support and they put her on hold while talking to engineering. Finally the customer support tells the customer about several supported DVD options. The customer chooses a DVD and it is shipped by the mail department the customer receives the DVD, installs it satisfactorily and then mails her payment accounting. Construct an activity diagram for this process. Use Swim lens to show the various interactions.
6. Prepare an activity diagram for awarding marks to regular student. If the student has attended 80% classes, He is awarded minimum 5 marks. If the student has attended more than 80% classes, He is awarded 10 marks. Those who have completed 50% are given 5 marks and rests are given 0 marks.
7. Explain lifeline, stop notation, object activation and suspension.
8. Explain messages on collaboration diagram.
9. Explain modeling communication diagram with sequence numbers to guide the execute order of the messages.
10. Explain submachine states.
11. What is sequence model? Explain with suitable example.
12. Write a short note on Activity model.
13. State diagram for photocopy machines.
14. State diagram for home security system

UNIT – IV OBJECT ORIENTED DESIGN

1. Explain Object Oriented Design Process
2. Explain Oriented Constraints Language
3. Explain refining attributes for Bank client class
4. Explain Packaging and Managing Classes with UML class diagram for bank ATM system.
5. Explain Table Class Mapping with diagram
6. Explain three steps of prototyping user interface
7. Explain component icon, name, stereotype and interface
8. Explain the view layer class design technique.
9. Explain port, provided interface and required interface with an example.
10. Explain the design of access layer classes with illustrative flow chart.
11. Explain object relation mapping technique with illustrative example.
12. Explain table inherited class mapping.

UNIT – V DESIGN PRINCIPLES AND PATTERNS

1. Explain the need for creator pattern.
2. Describe the concept of creator.
3. Explain the information expert pattern with some illustrative example.
4. Define coupling
5. Explain the concept of low coupling with some suitable example.
6. What is the controller pattern? Explain it with some suitable example.
7. Enlist the benefits of controller object.
8. What is GRASP?
9. Explain creator and controller design patterns with examples.
10. What is high cohesion? Give example of it.
11. Write complete documentation for adapter design pattern.

UNIT VI: ARCHITECTURAL DESIGN

1. Explain client server software architecture. Describe Multiple Client server architectural patterns with example.
2. Explain synchronous communication pattern in client server architecture with help of a diagram.
3. Describe location transparency and platform transparency with reference to SOA.
4. Explain the broker pattern for design of service oriented architecture.
5. Explain the important characteristics of real time software architecture.
6. Explain hierarchical control architecture pattern in real time software architecture.
7. Explain web service elements.
8. Explain call and return architecture.
9. Explain Architectural views.
10. Explain layered architecture TCP/IP reference model.



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Mid prelim (AY: 2019-20)

Subject: SOFTWARE DESIGN AND MODELING (Set A)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

Q1.a) Differentiate between views of software development. [5]

b) Explain phases in OMT by Rambaugh. [5]

OR

Q2a) What is model driven Architecture (MDA)? Explain how transformation is carried out in MDA. [5]

b) Draw and explain 4+1 view architecture of UML. [5]

Q3a) Enlist explain different kinds of relationships used in class diagram. [3]

b) Passport automation system: Passport automation system is used in the effective [7]

dispatch of passport to all the applicants. This system adopts a comprehensive approach to minimize the manual work and schedule resources, time in a cogent manner. The core of the system is to get the online registration form (with details such as name, address etc..) filled by applicant whose testament is verified for its genuineness by the passport Automation system with respect to already existing information in the database. This forms the first and foremost step in the processing of passport application. After the first round of verification done by the system, the information is in turn forwarded to the regional administrator's office. The application is then processed manually based on report given by the system, and any forfeiting identified can make the applicant liable to penalty as per the law. The system forwards the necessary details to the police for its separate verification whose report is then presented to the administrator. After all the necessary criteria have been met, the original information is added to the database and the passport is sent to the applicant.

Identify Actors, Use-cases and draw USE case Diagram(s) for the above case study.

OR

Q4) Convert the following into a class diagram with appropriate classes, relationships, multiplicity **[10]**

- a) A computer program has many statements. An expression is a statement. A function is a 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.
- 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.
- c) A drawing object is a text, a geometric object or a group. Group can contain at least two geometric objects. Point, polygon are geometrical objects. A polygon is composed of an ordered set of points.

Q5a) Prepare an activity diagram for awarding marks to regular student. If the student has attended 80% classes, He is awarded minimum 5 marks. If the student has attended more than 80% classes, He is awarded 10 marks. Those who have completed 50% are given 5 marks and rests are given 0 marks. **[5]**

b) Assume a home telephone instrument and give the meaning of Event, State and transition. **[5]**

OR

Q6a) Online Course Registration System: **[6]**

The requirement form the customer is got and the requirement about the course registration is defined. The requirement is analyzed and defined so that is enable the student to efficiently 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. Draw the sequence diagram(s) for the case study.

b) Explain concurrent sub-states with suitable examples. **[4]**



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Mid prelim (AY: 2019-20)

Subject: SOFTWARE DESIGN AND MODELING (Set B)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

Q1.a) What are different things in UML – Explain. 5

b) Explain importance of object oriented in software development. 5

OR

Q2a) What is Unified approach in software development? 5

b) Explain layered approach to software development. 5

Q3a) Elaborate the keywords class, association end name and multiplicity with an example. 3

b) Given the following problem description, produce an object oriented solution. 7

Answer the following questions about 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 of each game are determined using a

function bases on the height, strength and accuracy of the players on each team.

i. Identify all software classes, their attributes & methods.

ii. Draw a software class diagram showing association
between classes and multiplicities.

iii. Which object contain other objects?

iv. Which objects exhibit super-class sub-class relationship?

OR

Q4 a) Ticket reservation software provides following facilities to the users namely 7

i) Check ticket availability

ii) Add passenger details

iii) Book ticket

- iv) Make payment
The payment can be made by credit card or net banking. While booking a ticket, the user may optionally choose a seat of his preference. Draw a suitable use case diagram.
- b) Diagrammatically show generalization, include and extend relationship in the context of a use case diagram. 3
- Q5 a) A customer decides to upgrade her PC and purchase a DVD player. She begins by calling the sales department of the PC vendor and they tell her to talk to customer support. She then calls customer support and they put her on hold while talking to engineering. Finally the customer support tells the customer about several supported DVD options. The customer chooses a DVD and it is shipped by the mail department the customer receives the DVD, installs it satisfactorily and then mails her payment accounting. Construct an activity diagram for this process. Use Swim lens to show the various interactions. 6
- b) Explain transition & guard condition in state diagram with example. 4
- OR
- Q6 a) Insurance system provides vehicle insurance to the owners. Initially the customers fill the form which has vehicle details and owner's details. This information is submitted to an agent. The agent sends the information to various insurance companies. The companies quote the insurance. The agent selects a best policy and gives it to the owner. Draw an activity diagram with swim lanes and other applicable notations. 6
- b) Elaborate composite state and concurrent state with an example. 4



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Prelim (AY: 2019-20)

Subject: SOFTWARE DESIGN AND MODELING (Set A)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

Q1.a) List and explain object oriented methodologies. 5

b) A file 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. 5

OR

Q2a) Draw a use case diagram with appropriate relationships and notations for the following description 5

A software is to be developed for an alarm simulation. User can choose a display mode of 12 hours display. User can set time, user can set alarm, turn off alarm or snooze.

b) Elaborate association, aggregation and composition with an example. 5

Q3a) Draw activity diagram for the library case study shown below. List all activities used in the diagram. 7

Library case study:

Following is process to issue a book:

Every book has a barcode sticker pasted on it. Every employee has I-card on which also barcode sticker is pasted. Employee has to select a book and has to approach to librarian. *Librarian* scans the barcode of the book with barcode scanner. Then employee has to scan barcode on I card with barcode scanner. Librarian has to ensure book details, employee details and finalize the issue transaction of the book. Librarian tells return date to employee.

Following is process to return a book:

Employee has to carry the book to the librarian and librarian has to initiate the return transaction. Employee has to scan barcode sticker of I- card and book with barcode scanner. System calculates fine by using fine calculation rules.

Librarian asks for fine amount to employee if any. Employees pay the fine. Librarian finalizes the return transaction. Note that in above system, if barcode scanner does not work, librarian should be able to enter data using keyboard. There should be provision of providing rules of fine calculation. Even if employee doesn't have barcode sticker on I-card, librarian should be able to input employee id manually.

- b)** Elaborate fork and join in the context of activity diagram **3**

OR

- Q4 a)** Draw a state diagram for ATM system with the following scenario. Initially the ATM is in IDLE state and displays bank's advertisement on the screen. When the customer inserts the card into the ATM, the ATM transits from IDLE state to ACTIVE state. ATM being in active state, when the card Inserted event arrives, it is going in the waiting for PIN state, during which time the ATM is waiting for the customer to input the PIN. When the customer completes the entering of PIN, the ATM transits to the Validating PIN state. When the customer entered PIN matches the stored PIN for the card. Assuming the PIN validation successful, the ATM transits to waiting for customer choice state. **6**

- b)** What is the relation between use cases and sequence diagram? Explain the keywords participants time line, focus of control, and synchronous message with respect to sequence diagram. **4**

- Q5 a)** Explain the process of creating an access for business classes with diagram. **8**

- b)** Consider bank ATM database system and explain creation of objects Model by giving one example each for- **8**
- i) Table – class mapping
 - ii) Table – Multiple classes mapping
 - iii) Table – inherited classes mapping
 - iv) Tables – inherited classes mapping

OR

- Q6 a)** Explain the view layer class design technique **8**

- b)** Write short note on Attribute refinement **8**

- Q7 a)** Name the types of GRASP design pattern with one example of each type. **8**

A chess game includes 2 players 32 pieces(16 per player) and a game board with 64 squares. Draw a class diagram for Chess game showing Creator and

Polymorphism GRASP Pattern.

OR

- Q8 a)** Apply strategy design pattern to the following and draw the class diagram. A company has many employees. Each employee has a name and performance index in the range of 1 to 5. When the index is 2, the increment is 10% of the previous salary, 3 the increment is 15% of previous year salary, 4 the increment is 20 % of previous year salary and when 5 the increment is 25% of previous year salary. Indicate the roll of each class in the class diagram **8**
- b)** Define design pattern? Explain the classification of GOF design pattern? Name the types of Design pattern with one example of each type. **8**
- Q9 a)** Write short notes on : **18**
- i. Software Architecture Broker pattern
 - ii. Control pattern for real time software software architecture
 - iii. Software process Model for software product line.
- OR
- Q10a** Explain synchronous and asynchronous message communication pattern **9**
- b)** Explain any two client/server architecture pattern with deployment diagram and its example **9**



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Prelim (AY: 2019-20)

Subject: Theory Of Computation (Set B)

Year: Second Year (Sem - I)

Time: 2 Hr.

Marks: 50

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

Q1.a) What is Unified approach in software development? 5

b) A country has many citizens among all can be identified by an Adhar card. 5

Represent this as a qualifier association. Two diagrams are expected. One without qualifier and the other with qualifier.

OR

Q2a) What is qualified association? Draw its notation in using an example. 5

b) A book is composed of tables of contents, preface, many chapters and index. 5
Chapters are composed of sections. Convert this using a class diagram.

Q3a) A simple digital watch has a display and two buttons 'A' and 'B' to set it. The 7
watch has two modes of display, 'display time' mode and 'set time' mode. In the display time mode, the watch displays the hour 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 modes advances in sequence: display time, set hours and set minutes. Within the submodes, the B button must be released before they can generate another event. Prepare a state diagram of the watch.

b) Draw the notations of synchronous, asynchronous, return, create object and 3
destroy object message in the context of sequence diagram.

OR

Q4 a) Consider an online web bases "Computer Rental System" Draw sequence 6
diagram for Rent a computer use case with the following assumptions.

The customer needs to first select the type of computer he wants to rent. The database of computer is maintained based on its types like: Desktop, Laptop, Notepads, Pocket PC etc. Based on the type of computer the rents are displayed, if the chosen type of computer is available, the booking is done, confirmed, the

booking details is stored and the customer is issued an electronic confirmation of the booking.

b) Define state, transition, entry, exit and do action in the context of state diagram. **4**

Q5 a) Explain **8**

i. Table class mapping

ii. Table inherited class mapping

b) Explain prototyping the user interface technique. **8**

OR

Q6 a) A university having several departments. Each department should have **8**

minimum one faculty member to maximum of 10 faculty member. Each faculty member has residential address within proximity within 2 Kms. Attributes of entities are. Department: department name, department type, department start date, current HOD Faculty: Faculty ID, Faculty name, subject specialization, Joining date, DOB, Salary Address: building name, Flat no, Street name, Landmark, Pincode, state country.

Develop the design level business layer class diagram using OCL Attribute and Method representation, and Multiplicity between business classes

b) Explain the Macro –Level process of identification of view layer classes by analyzing use case. **8**

Q7 a) Explain Strategy pattern **8**

Suppose we have an Invoice class in a payment system in which we have to calculate total amount payable but requirement says that amount of calculation depends on member customer or non member customer. Draw a class diagram showing strategy pattern.

b) Define design pattern? Explain the classification of GOF design pattern? Name the types of Design pattern with one example of each type. **8**

OR

Q8 a) Draw the class diagram and identify the roles for a state design pattern. Mention **8**

the roles identified for each class and its relevant behavior in the class diagram. When a book isbn number, title and one or more authors. When it is brought in the library it gets 'purchases' state when it is added to a catalogue it goes to 'catalogue' state. When the cataloguing is complete it goes to 'Available on stack' state. When it is borrowed by a member it goes to 'borrowed' state. When it is returned by a member it goes to 'available on stack' state.

- b) Explain the information expert pattern. **8**
- Q9 a)** Write short note on designing concurrent and real time software Architecture. **9**
- b) Explain component based software architecture.

OR

- Q10a** Explain any two client/server architecture pattern with deployment diagram and its example **9**
- b) Write short note on designing Product Line software Architecture. **9**

**414456E: ELECTIVE-I
BUSINESS ANALYTICS AND INTELLIGENCE**

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 Baccara-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



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RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE

TEACHING PLAN

CLASS: BE **ACADEMIC YEAR:** 2019-2020

TERM: I

SUBJECT: BAI (Subject Code: 414456E)

SUBJECT FACULTY: Mrs. Sweta Kale

BRANCH: INFORMATION TECHNOLOGY

%SUBJECT RESULT FOR LAST THREE YEARS:

Le ct. No	Units	Planned Dates	Syllabus	Actual Dates	Topics & Contents Covered
UNIT I: DECISION MAKING AND DECISION SUPPORT SYSTEMS (7 Hrs)					
1	UNIT I	17/6/2019	The role of computerized support for decision making and its importance.		
2		18/6/2019	Types of decisions managers face, and the process through which they make decisions.		
3		19/6/2019	Decision making styles, the four stages of Simon’s decision making process, and common strategies and approaches of decision makers.		
4		20/6/2019	The role of Decision Support Systems (DSS), its main components, the various		
5		24/6/2019	DSS types and classification, and how DSS have changed over time.		
6		25/6/2019	How DSS supports each phase of decision making		
7		26/6/2019	summarize the evolution of DSS applications, and on how they have changed over time		
UNIT II: BUSINESS INTELLIGENCE CONCEPTS AND PLATFORM CAPABILITIES (7 Hrs)					
8	UNIT II	26/6/2019	Definition of business intelligence (BI),		
9		1/7/2019	BI architecture, and its components, and relation with DSS.		
10		2/7/2019	The main components of BI platforms, their capabilities, and the competitive landscape		

			of BI platforms.		
11		3/7/2019	The building blocks of business reports, the types of business reports, and the components and structure of business reporting systems.		
12		4/7/2019	Role of Mathematical model in BI, Factors Responsible for successful BI Project,		
13		8/7/2019	Obstacle to Business Intelligence in an Organization		
14		9/7/2019	Different types of OLAP and their applications, and the differences between OLAP and OLTP		
UNIT III: DATA VISUALIZATION AND DASHBOARD DESIGN (7 Hrs)					
15	UNIT III	18/7/2019	The top job responsibilities of BI analysts by focusing on creating data visualizations and dashboards.		
16		23/7/2019	The importance of data visualization and different types of data that can be visually represented.		
17		24/7/2019	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.		
18		25/7/2019	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.		
19		30/7/2019	Common characteristics of dashboard, the types of dashboards,		
20		31/7/2019	List attributes of metrics usually included in dashboards..		
21		1/8/2019	The guidelines for designing dashboard and the common pitfalls of dashboard design		
UNIT IV: BUSINESS PERFORMANCE MANAGEMENT SYSTEMS (7 Hrs)					
22		13/8/2019	This module focuses on how BI is used for Business Performance Management (BPM).		

23	UNIT IV	19/8/2019	The main components of BPM as well as the four phases of BPM cycle and how organizations typically deploy BPM.		
24		20/8/2019	The purpose of Performance Measurement System		
25		21/8/2019	how organizations need to define the key performance indicators (KPIs) for their performance management system..		
26		22/8/2019	Four balanced scorecards perspectives and the differences between dashboards and scorecards.		
27		26/8/2019	The benefits of using balanced scorecard		
28		27/8/2019	using Six Sigma in a performance measurement system		
UNIT V: ROLE OF BUSINESS INTELLIGENCE AND ANALYTICS IN BUSINESS (7 Hrs)					
29	UNIT V	3/9/2019	The role of visual and business analytics (BA) in BI		
30		4/9/2019	and how various forms of BA are supported in practice.		
31		5/9/2019	ERP and Business Intelligence, BI Applications in CRM, BI Applications in Marketing,		
32		6/9/2019	BI Applications in Logistics and Production,		
33		9/9/2019	Role of BI in Finance, BI Applications in Banking,		
34		10/9/2019	BI Applications in Telecommunications,		
35		11/9/2019	BI Applications in Fraud Detection, BI Applications in Retail Industry		
UNIT VI: ROLE OF BUSINESS INTELLIGENCE AND ANALYTICS IN BUSINESS (7 Hrs)					
36	UNIT VI	12/9/2019	BI maturity and strategy. Different levels of BI maturity,		
37		16/9/2019	the factors that impact BI maturity within an organization,		
38		17/9/2019	and the main challenges and the potential solutions for a pervasive BI maturity within an organization.		
39		18/9/2019	The critical success factors for implementing a BI strategy,		

40		19/9/2019	BI framework, and BI implementation targets. Open Source BI.		
41		23/9/2019	Big Data systems. Social BI systems, Geographic BI systems.		
42		25/9/2019	Customer Experience based BI.		

100% Syllabus Coverage.

Mrs. Sweta Kale
Subject In-charge

Prof. Sweta Kale
HOD (IT)

Signature Not Verified

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UNITWISE QUESTION BANK

Subject: BUSINESS ANALYTICS AND INTELLIGENCE

UNIT I: DECISION MAKING AND DECISION SUPPORT SYSTEMS

- Q.1 Explain the benefits of BI & Explain the role of intelligence in creation and use of BI governance.
- Q.2 List the reason the Web is utilized for DSS development and deployment. Describe DSS as an Umbrella term
- Q.3 List the nine major categories of decision support tool.
- Q.4 List and briefly describe Simon's four phases of decision making. List the DSS classification.
- Q.5 Describe the different categories of model and its benefits of DSS
- Q.6 Explain the architecture of BI its components and relation with DSS
- Q.7 State factor affecting for successful BI project. Explain the role of mathematical model in BI
- Q.8 Explain the architecture of BI its components and relation with DSS
- Q.9 State factor affecting for successful BI project. Explain the role of mathematical model in BI
- Q.10 How can modern IT tools help synthesize qualities and quantitative factors in decision making?
- Q.11 List and describe the three major components of DSS.

UNIT II: BUSINESS INTELLIGENCE CONCEPTS AND PLATFORM CAPABILITIES

- Q.1 Explain the architecture of BI its components and relation with DSS.
- Q.2 State factor affecting for successful BI project. Explain the role of mathematical model in BI.
- Q.3 How can modern IT tools help synthesize qualities and quantitative factors in decision making?
- Q.4 List and describe the three major components of DSS.
- Q.5 Explain the role of mathematical model in BI
- Q.6 What are different types of OLAP and their applications, state difference between OLAP and OLTP.
- Q.7 What are the building blocks of business reports? Explain the different types of business report.
- Q.8 What are the factors responsible for successful BI project.

UNIT III: DATA VISUALIZATION AND DASHBOARD DESIGN

Q.1 What is the responsibilities of BI analysts.

Q.2 What is the importance of data visualization.

Q.3 Explain basic and composite chart.

Q.4 List the attributes of Metrics usually included in Dashboards.

Q.5 What are the guide line for designing dashboard and what are the common pitfalls of dashboard design.

Q.6 What are the Common characteristics of dashboard.

Q.7 Explain how to determine which visualization is most effective to display data for a given data set.

UNIT IV: BUSINESS PERFORMANCE MANAGEMENT SYSTEMS

Q.1 What are the main components of BPM

Q.2 Explain the four phases of BPM cycle.

Q.3 Explain how organization typically deploys BPM.

Q.4 What is the purpose of Performance Measurement System

Q.5 Explain the key performance indicators (KPIs) for the performance management system.

Q.6 Explain the four balanced scorecards perspectives

Q.7 Differences between dashboards and scorecards.

Q.8 What is 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

- Q.1 Explain the role of visual and business analytics.
- Q.2 Explain the BI application in CRM
- Q.3 Explain the BI application in marketing
- Q.4 BI has help Banking sector? Explain in detail
- Q.5 Explain the role of business analytics
- Q.6 Explain the role of BI in fraud detection system
- Q.7 How retail industry has excelled using BI. Explain
- Q.8 Explain security management in terms of BI infrastructures
- Q.9 Explain steps in designing BI systems
- Q.10 Explain the role of BI in market basket analysis & Telecommunication
- Q.11 How BI is applied in CRM
- Q.12 Explain security management in terms of BI infrastructures
- Q.13 Consider the database of online retail shop. Use suitable BI techniques to derive discount on various items in the shop to increase profit. Explain technique used in same.

UNIT VI: ROLE OF BUSINESS INTELLIGENCE AND ANALYTICS IN BUSINESS

Q.1 What is open source BI

Q.2 Explain social BI system

Q.3 What is geographic BI system

Q.4 What are the various success factors for implementing BI

Q.5 Explain BI application in logistics and production.

Q.6 Explain the role of BI in finance.

Q.7 What are the factors that impact BI maturity.

Q.8 What is pervasive BI

Q.9 Explain BI frame work

Q.10 Explain different level of BI maturity



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Mid prelim (AY: 2019-20)

Subject: BUSINESS ANALYTICS AND INTELLIGENCE (Set A)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

- Q.1** List and briefly describe Simon's four phases of decision making. List [5]
a) the DSS classification.
b) List the reason the Web is utilized for DSS development and [5]
deployment. Describe DSS as an Umbrella term
- OR**
- Q.2** List the nine major categories of decision support tool and role of [5]
a) Decision support system
What is ROLAPL , MOLAP, HOLAP, how do they differ from OLAP.
b) List the differences and similarities between role of database [5]
administrator and data warehouse administrator
- Q.3** What are the building block of business reports . Explain the types of [5]
a) business reports
b) Describe the different categories of model and its benefits of DSS [5]
- OR**
- Q.4** Explain the architecture of BI its components and relation with DSS [5]
a)
State factor affecting for successful BI project. Explain the role of
b) mathematical model in BI [5]
- Q.5** Explain the job responsibilities of BI analysts for creating data [5]
a) visualization
b) Explain the types of basic and composite charts [5]



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Mid prelim (AY: 2019-20)

Subject: BUSINESS ANALYTICS AND INTELLIGENCE (Set B)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) Explain the architecture of BI its components and relation with DSS [5]
State factor affecting for successful BI project. Explain the role of
b) mathematical model in BI [5]

OR

- Q.2 a) How can modern IT tools help synthesize qualities and quantitative [5]
factors in decision making?
b) List and describe the three major components of DSS. [5]

- Q.3 a) Explain the role of mathematical model in BI [5]
b) What are different types of OLAP and their applications, state difference [5]
between OLAP and OLTP

OR

- Q.4 a) Explain building blocks of business report and its types [5]
b) [5]

- Q.5 a) What are the building blocks of business reports? Explain the different [5]
types of business report.
Explain the guidelines for designing dashboard and what are the common
b) pitfalls of dashboard design. [5]

OR

- Q.6 a) Explain the importance of data visualization. State the difference [5]
between dashboard and scoreboard
b) Explain the phase of BPM Cycle [5]



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Prelim (AY: 2019-20)

Subject: BUSINESS ANALYTICS AND INTELLIGENCE (Set A)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

Q.1 a) Explain the role of decision support system with its main components. [6]

b) What are the different factors responsible for successful BI projects?
Briefly explain? [4]

OR

Q.2 a) Explain data visualization. Explain the job responsibilities of BI for creating data visualization [4]

b) Explain four stages of Simon's decision system. [6]

Q.3 a) What is dash board? Explain different types of dashboards. [6]

b) What are different types of charts? Explain any two. [4]

OR

Q.4 a) Describe the approaches of decision makers. [4]

b) Explain the importance of data visualization techniques. [6]

Q.5 a) Explain the phases of BPM cycle. [8]

b) Differentiate between dashboard and scoreboards. [8]

OR

Q.6 a) Explain the purpose of performance measurement system and how organizations need to define key performance indicators? [8]

b) Write the benefits of using balance score cards vs using six sigma in a performance measurement system. [8]

7 a) Explain the role of BI in ERP with an example. [8]

b) Explain the different ways BI software can help in improving sales and marketing process. [8]

OR

- Q.8 a) Explain in detail the role of BI in finance sector. [8]
b) What are the various domains where BI can help in improving sales and marketing process. [8]

- Q.9 a) Explain different levels of BI Maturity [10]
b) Explain the main challenges and potential solutions for the pervasive BI Maturity [8]

OR

- Q.10a) Explain with example, how the customer experience helps in building an effective BI systems. [10]
b) Write short notes on i) Geographic BI system ii) Social BI systems [8]



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Prelim (AY: 2019-20)

Subject: BUSINESS ANALYTICS AND INTELLIGENCE (Set B)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) What are the various Design and implementation issue of OLTP? [6]
b) Explain any two OLAP operations with the help of examples. [4]

OR

- Q.2 a) Define BI and explain BI components in detail. [6]
b) Write a short note on the role of data warehouse in Business Intelligence. [4]

- Q.3 a) Explain the role of DSS and briefly explain its main component [6]

- b) What is the building block of business report? Explain the role of [4]

OR

- Q.4 a) Describe the three steps of ETL process. [6]
b) What is meant by loading in ETL? Explain incremental loading and full loading. [4]

- Q.5 a) Explain the main components of BPM? What is the use of Performance Measurement System. [8]
b) Differentiate between dashboard and scoreboards. [8]

OR

- Q.6 a) Explain how BI is used in BPM. Explain the KPIs for performance measurement system [8]
b) Write the benefits of using balance score cards vs using six sigma in a performance measurement system [8]

- Q.7 a) Explain Business Analytics Life cycle [8]
b) Explain BI application in Logistics and Production [8]

OR

- Q.8 a) Explain BI application in Retail Industry. [8]
b) What is decision tree? How is it used for business analytics? Describe in brief. [8]

- Q.9 a) Explain Different levels of BI Maturity [10]

- b) Explain the factors that impact BI Maturity within organization [8]

OR

- Q.10a) Write short notes on i) Geographic BI system ii) Social BI systems [10]

- b) Explain the main challenges and potential solutions for the pervasive BI maturity [8]

**414457C: ELECTIVE-II
SOFTWARE TESTING AND QUALITY ASSURANCE**

Teaching Scheme:
TH:03 Hours/Week

Credits: 03

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

7 Hrs

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

7 Hrs

SQA basics, Components of the Software Quality Assurance System, software quality in business context, planning for software 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 Learning, Pvt, Ltd.
8. Watts S Humphrey, Managing the Software Process ,Pearson Education Inc.



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TEACHING PLAN

CLASS: BE ACADEMIC YEAR: 2019 – 2020

TERM: I

SUBJECT: SOFTWARE TESTING AND QUALITY ASSURANCE (414457C: Elective-II)

SUBJECT FACULTY: Ms. Gauri Patil

BRANCH: INFORMATION TECHNOLOGY

Lect No.	Unit No	Planned Dates	Planned Topics & Contents	Actual Dates	Topics & Contents covered
			UNIT I: SOFTWARE TESTING BASICS (7 Hrs)		
1	UNIT I	17/6/2019	Testing as an engineering activity, Role of process in software quality		
2		19/06/2019	Testing as a process, Basic definitions		
3		20/06/2019	Software testing principles		
4		24/06/2019	The tester’s role in a software development organization		
5		26/06/2019	Origins of defects, Defect classes		
6		27/06/2019	The defect repository and test design, Defect examples		
7		1/07/2019	Developer / Tester support for developing a defect repository.		
UNIT II: TESTING TECHNIQUES AND LEVELS OF TESTING (7 Hrs)					
8	UNIT II	1/07/2019	Using White Box Approach to Test design		
9		3/07/2019	Static Testing Vs. Structural Testing		
10		4/07/2019	Code Functional Testing, Coverage and Control Flow Graphs		
11		8/07/2019	Using Black Box Approaches to Test Case Design, Random Testing, Requirements based testing		
12		10/07/2019	Decision tables, State-based testing, Cause-effect Graphing		
13		11/07/2019	Error guessing, Compatibility testing, Levels of Testing -Unit Testing, Integration Testing,		
14		11/07/2019	Defect Bash Elimination. System Testing - Usability and Accessibility Testing, Configuration Testing, Compatibility Testing.		

UNIT III: SOFTWARE TEST AUTOMAION AND QUALITY METRICS (7Hrs)					
15	UNIT III	17/07/2019	Software Test Automation, Skills needed for Automation		
16		18/07/2019	Scope of Automation, Design and Architecture for Automation		
17		18/07/2019	Requirements for a Test Tool, Challenges in Automation Tracking the Bug, Debugging		
19		22/07/2019	Testing Software System Security - Six-Sigma, TQM - Complexity Metrics and Models		
19		24/07/2019	Quality Management Metrics, Availability Metrics		
20		25/07/2019	Defect Removal Effectiveness, FMEA, Quality Function Deployment		
21		14/08/2019	Taguchi Quality Loss Function, Cost of Quality.		
UNIT IV: FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE (7 Hrs)					
22	UNIT IV	14/08/2019	SQA basics		
23		19/08/2019	Components of the Software Quality Assurance System		
24		19/08/2019	software quality in business context		
25		21/08/2019	planning for software quality assurance		
26		22/08/2019	product quality and process quality		
27		22/08/2019	Software process models		
28		26/08/2019	7 QC Tools and Modern Tools.		
UNIT V: QUALITY ASSURANCE MODELS (7 Hrs)					
29	UNIT V	28/08/2019	Models for Quality Assurance		
30		29/08/2019	ISO-9000 series		
31		29/08/2019	CMM		
32		04/09/2019	CMMI		
33		05/09/2019	Test Maturity Models		
34		09/09/2019	SPICE		
35		12/09/2019	Malcolm Baldrige Model- P-CMM.		
UNIT VI: SOFTWARE QUALITY ASSURANCE TRENDS (7 Hrs)					
36		16/09/2019	Software Process- PSP and TSP		
37		18/09/2019	OO Methodology, Clean-room software engineering Defect		

38	UNIT VI	19/09/2019	Injection and prevention		
39		23/09/2019	Internal Auditing and Assessments		
40		25/09/2019	Inspections & Walkthroughs Cases		
41		26/09/2019	Inspections & Walkthroughs Cases		
42		30/09/2019	Tools and their Affect on Software Quality.		

100% Syllabus Coverage.

Ms. Gauri S. Patil
Subject In-charge

Prof. Sweta Kale
HOD (IT)

Signature Not Verified

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RMD SINHGAD SCHOOL OF ENGINEERING, WARJE, PUNE

UNITWISE QUESTION BANK

Subject: SOFTWARE TESTING AND QUALITY ASSURANCE

UNIT I: SOFTWARE TESTING BASICS

1. Explain Software Testing Principles.
2. Describe the defect classes in detail with example
3. Explain defect repository
4. Explain defect classes
5. Write role of tester in software development organization
6. Explain testing as a process
7. Role of process in software quality explain
8. Describe testing as an engineering activity
9. Write any to defect classes in details.
10. Compare validation and verification
11. Define software quality
12. Define the role of SQA group
13. Define metrics

UNIT II: TESTING TECHNIQUES AND LEVELS OF TESTING

1. Explain static testing in details with example
2. Explain structural testing in details with example
3. What is code functional testing?
4. Explain code coverage testing with examples
5. Write challenges of white box testing
6. Give state transition diagram to explain use of state based testing
7. What is configuration testing? Explain its objective.
8. Write steps of capability testing process
9. Explain Unit testing
10. Give example to demonstrate use of decision tables

UNIT III: SOFTWARE TEST AUTOMATION AND QUALITY METRICS

1. What to automate in software testing
2. Explain design and architecture for automation
3. What is complexity metrics model
4. What is failure mode effects analysis?
5. What is six sigma lifecycle
6. What is TQM
7. What is availability metrics?
8. What is quality function deployment?
9. What are challenges in automation
10. What are roles and responsibilities for a successful Six Sigma quality program

UNIT IV: FUNDAMENTALS OF SOFTWARE QUALITY ASSURANCE

1. What is the difference between quality assurance, quality control and testing?
2. Explain the components of SQA system
3. Explain software quality in business control
4. Describe SQA plan in details
5. Explain product quality and process quality with examples
6. Compare and contrast product quality and process quality
7. Write a note on software process models
8. Explain 7 basics quality tools with examples
9. Explain modern quality tools with examples
10. List out the components of pre project documents

UNIT V: QUALITY ASSURANCE MODELS

1. Explain the models for quality assurance
2. What is ISO
3. What is difference between ISO 9000 standards and IS?ISO 9000 standards
4. What is Capability Maturity Model
5. Explain the levels of the CMM
6. State and explain the key process areas of CMM at each level
7. Compare and contrast CMM and CMM1
8. State and explain the levels of TMM?
9. Explain Malcolm baldrige Model
10. How to implement the requirements of IS/ISO 9001:2008 in an organization
11. What are benefits of TMM?

UNIT VI: SOFTWARE QUALITY ASSURANCE TRENDS

1. Define personal Software Process (PSP) and Team Software Process (TSP) in details.
2. Explain TSP launch meeting
3. Explain the requirement of PSP and TSP
4. List and explain object oriented methodologies
5. Explain the objective of Object Oriented Methodologies
6. Explain defect injection with suitable examples.
7. Explain the steps in inspection process with neat diagram
8. State and explain CASE tools
9. Explain the stages of data models
10. What is refactoring
11. What is the role of UML in CASE tools?

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Mid prelim (AY: 2019-20)

Subject: SOFTWARE TESTING AND QUALITY ASSURANCE (Set A)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) Explain Software testing life cycle phases [5]
b) Explain defect life cycle [5]

OR

- Q.2 a) Define the following terms: i) Fault ii) Test bed [5]
iii) Test case iv) Software quality
b) Explain V model of testing [5]

- Q.3 a) Explain configuration testing and its objectives [5]
b) Describe TQM for inventory management. [5]

OR

- Q.4 a) Explain the steps in developing test cases with a cause-and-effect graph [5]
b) Give difference between Black box testing and White box testing [5]

- Q.5 a) Explain Taguchi Quality Loss Function [5]
b) Explain 7 QC tools in detail [5]

OR

- Q.6 a) Write a short Note on FMEA [5]
b) Explain six sigma life cycles [5]



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Mid prelim (AY: 2019-20)

Subject: SOFTWARE TESTING AND QUALITY ASSURANCE (Set B)

Year: Third Year (Sem - I)

Marks: 30

Time: 1 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6

ii) Neat diagrams must be drawn whenever Necessary

Q.1 a) what are various testing principles? [5]

b) Explain tester's role in software development organization [5]

OR

Q.2 a) Define the role of SQA group [5]

b) Describe the defect classes in details with examples [5]

Q.3 a) Explain white box testing and black box testing [5]

b) Explain static testing in details with examples [5]

OR

Q.4 a) What is configuration testing? Explain its objectives [5]

b) What is error guessing in testing [5]

Q.5 a) What is six sigma life cycle? [5]

b) What is failure mode effects analysis (FMEA)? [5]

OR

Q.6 a) Explain Taguchi quality loss function [5]

What are roles and responsibilities for successful Six Sigma Quality

b) Program [5]



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Prelim (AY: 2019-20)

Subject: SOFTWARE TESTING AND QUALITY ASSURANCE (Set A)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

ii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) What are various testing principles? [6]
b) Explain White box testing and black box testing [4]

OR

- Q.2 a) What is six sigma? Explain its methodologies? [6]
b) Explain tester's role in software development organization [4]

- Q.3 a) Explain different type of system testing [6]
b) Describe TQM for inventory management [4]

OR

- Q.4 a) Draw a control flow graph for following code and label each node so that it is linked to corresponding statement [6]

```
int evensum(int i){  
    int sum=0;  
    while(i<=10) {if(i/2== 0)  
        sum = sum +I; i++;  
    }  
    Return sum;  
}
```


b) Write a short Note on FMEA [4]

- Q.5 a) Explain 7 QC tools in details [8]
b) Explain planning for software quality assurance w.r.t your final project [8]

OR

- Q.6 a) Relate how components of SQA system can be applied to your project [8]
b) Explain product and process quality with an example [8]

- Q.7 a) Explain Malcom Balbrige model? [8]
b) Draw and explain CMMI levels [8]

OR

- Q.8 a) Write a short Note on:
a) CMM [8]
b) SPICE [8]
b) Explain in detail ISO 9000 model for quality assurance [8]

- Q.9 a) Write a short note on: [10]
a) OO methodology
b) Walkthrough
- b) Explain Clean room methodology in details along with diagram [8]
- OR**
- Q.10a) i) Explain software project internal auditing and assessments [10]
ii) Explain how different case tools affects on software quality
- b) Consider online banking system, state and inject 5 defect in the system [8]
which will cause flaw in the system and suggest it's preventive measures



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Prelim (AY: 2019-20)

Subject: SOFTWARE TESTING AND QUALITY ASSURANCE (Set B)

Year: Second Year (Sem - I)

Marks: 50

Time: 2 Hr.

Date: / /

Note: i) Solve Q1 or Q2 and Q3 or Q4 and Q5 or Q6 and Q7 or Q8

iii) Neat diagrams must be drawn whenever Necessary

- Q.1 a) Write role of tester in software development organization [6]
b) Explain use of code control flow graphs with examples [4]

OR

- Q.2 a) Write steps of compatibility testing process. [6]
b) Explain software testing principles [4]

- Q.3 a) What are roles and responsibilities for a successful Six Sigma quality program? [6]
b) Describe SQA plan in details [4]

OR

- Q.4 a) What is Failure mode effects analysis (FMEA)? [6]
b) What is the difference between quality assurance, quality control and testing? [4]

- Q.5 a) Explain 7 basic quality tools with an example [8]
b) Compare and contrast CMM and CMMI [8]

OR

- Q.6 a) What are the main benefits of implementing IS/ISO 9001:2008 Quality Management System Requirements? [8]
b) Explain how components of SQA system can be applied for final year project [8]

- Q.7 a) Explain the models for quality assurance [8]
b) What are benefits of Object Oriented Methodologies [8]

OR

- Q.8 a) Explain the effect of CASE tools on software quality [8]
b) Explain the Objectives of Object Oriented Methodologies [8]

- Q.9 a) Explain clean room methodologies in details along with diagram [10]
b) Explain inspection and walkthroughs with suitable examples [8]

OR

- Q.10a) i) Explain the steps in inspection process with neat diagram [10]
ii) Explain the requirements of PSP and TSP
b) Explain how different case tools affects on software quality [8]