



Academic Booklet

Academic Year 2024-25

**Bachelor of Engineering in Computer Science &
Engineering
(B.Tech. CE)
SEMESTER - 7**

Department of Computer Science & Engineering

**Parul Institute of Engineering & Technology Faculty of
Engineering & Technology**

Parul University

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About University

A multidisciplinary destination of learning and innovation, propelling quality in higher education with a record of being India's youngest private university to receive NAAC A++ accreditation in the first cycle. Situated in Vadodara, Gujarat, Parul University, is an embodiment of the nation's essence of cultural heritage blended with modern innovations and academic practices for student enrichment, while fostering national and global development. The University is an amalgamation of faculties and institutes that offer a plethora of diploma, undergraduate, postgraduate and doctoral programs in numerous disciplines. Through its uniquely structured, industry linked and field aligned programs, the University holds a noteworthy record of fulfilling the infinite dreams of students, by launching their lucrative careers towards high trajectories through start-up incubation and impeccable placement records. The 150+ acre eco-friendly campus is home to over 50,000+ students from every State of India and over 3,500 international students from 75+ countries, making Parul University a truly culturally global destination. In addition to its NAAC A++ accreditation, the University holds global memberships in bodies such as the Association of Commonwealth Universities. The University's stamps of quality extend to its DSIR recognition for quality research, NABL accreditation for quality in clinical medical research, NABH accreditation for quality healthcare and ARIIA Top 50 ranking for innovation achievements nationwide. In recognition of Parul University's excellence in education it has been awarded for being the Best Private University in Western India by Praxis Media and Best University in Placements by ASSOCHAM. Recently PU achieved a significant milestone by receiving prestigious diamond rating in QS I- Gauge Indian University rating 2024-26.

Vision of University

To make successful academic quests through entrepreneurship, research, modernization and partnerships, thus making PU the finest educational destination.

Mission of Parul University

- Bridging the gap between academia and career, by paying emphasis on development programs for both students and staff.
 - Promoting healthy relationships between PU's existing students, alumni, teachers and staff.
 - Forming associations with other universities and corporate firms of the nation and the world.
 - Presenting state of art infrastructure with high quality and energized work ethics
-

About the Institute

Parul Institute of Engineering and Technology (PIET) established in the year 2003, is a prominent educational institution located in Vadodara, Gujarat, India. It is part of Parul University and offers a range of undergraduate, postgraduate, doctoral programs and industry embedded programs in various engineering disciplines.

PIET is known for its modern infrastructure, state-of-the-art laboratories, and a strong emphasis on practical and industry-oriented education. The institute fosters innovation and research, providing students with opportunities to engage in projects and collaborations with industry partners. Additionally, PIET emphasizes holistic development through extracurricular activities, workshops, and seminars, aiming to produce well-rounded engineering professionals.

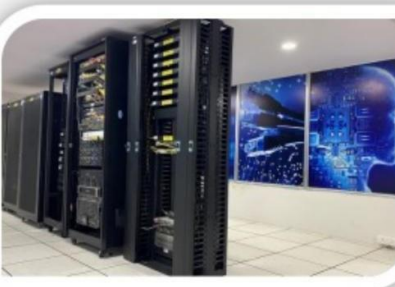
Reflecting its commitment towards academic excellence and overall development, Gujarat State Institute Ranking Framework (GSIRF) awarded Parul Institute of Engineering and Technology with 4 star ranking.

Vision of Institute

To be a centre par excellence for creating skilled professionals in Engineering.

Mission of Institute

To offer state-of-art education through undergraduate, postgraduate and doctoral programmes, for promoting entrepreneurship, enhancing employability, and engaging in research.



VISION

To be a distinct hub of education that prepares skilled professional in the field of Computer Science and Engineering.

MISSION

- Enhance academic performance by adopting industry-oriented curriculum focusing on thrust area of computer education through integrated learning in collaboration with prominent industries.
- Preparing students to face challenges of real world through internships and project-based learning.
- Foster a research culture that results in sound knowledge base, high-quality publications, new products and IPR.
- Inculcate ethical consciousness in students so that they can achieve success in their professional endeavors and can become responsible citizens.

CODE OF CONDUCT FOR STUDENTS

- All students of Parul University shall compulsorily display their University ID cards by wearing it round their neck. If any student is found without an ID card on any day, he/she will be marked absent for that day.
- The university expects all the students to behave in a manner expected of a prudent person.
- The students shall be dressed in a presentable manner which does not invite criticism from any quarter.
- The students shall strictly adhere to the class timings and be punctual in attending all classes.
- The students shall display cordial, genial and respectful behaviour towards their teachers.
- The students should be polite, cooperative and respectful in dealing with the employees of the University.
- The students shall maintain the highest order of cleanliness in the classroom as well as in the college premises.
- The students should not indulge in boisterous behaviour at any place on the university campus.
- The students shall follow the directions issued in accessing common places such as library, canteen, sports fields, auditorium, gymnasium, swimming pool etc...
- The students shall strictly follow the schedules given by the class teacher regarding the assignments, class tests, examinations, practicals etc...and shall complete the assigned work within the duration specified by their teachers.
- The students shall follow the instructions given by the teacher during practicals in relation to the use of laboratory/workshops/implements/equipments...
- Whenever the student has queries regarding their performance from either the class teacher or from any office in the College/University, they should follow the procedures laid down for the same and approach the concerned with utmost respect to the Authority.
- The students shall pay all prescribed fees at the stipulated times and avoid being penalized for non-payment of fees.
- The students shall not indulge in unfair means during the conduct of class tests/ internal and external examinations

- The students shall not indulge in unlawful assembly at any place in the campus.
 - Any problem encountered by the students should be brought to the notice of the Authorities immediately available in the College/University.
 - The students should never take law into their own hands and report any matter of lawlessness or harassment to the College Authorities immediately which, in turn, will initiate suitable action.
 - The students shall participate in all national events such as Independence Day, Republic Day organized by the University.
 - The students should not indulge in any of the activities which adversely affect the reputation of the University.
 - The students shall not consume prohibited substances such as alcohol, narcotics, Marijuana, Heroin, Cocaine etc. and shall not keep in their custody/hostel premises illegal objects/ materials such as firearms, missiles, bombs, narcotics, alcohol or other intoxicants etc. Smoking and chewing of tobacco is strictly prohibited in the campus.
 - UGC has directed all the universities to strictly implement anti-ragging measures in universities and colleges. It is also the responsibility of the institutions in the university to ensure safety of the newcomers and to protect them from any incidence which may harm either their physical or mental faculties. Any student, who has been found involved in the incident related to ragging, strict disciplinary action as enumerated in UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009 will be initiated against the delinquent student.
 - Any violation of the provisions mentioned above will be viewed as an Act of Misconduct and university, after conducting a thorough probe into such incidents, shall initiate strict disciplinary action against delinquent students.
-

CODE OF CONDUCT FOR FOREIGN STUDENTS WHILE RESIDING OUTSIDE THE UNIVERSITY CAMPUS:

A number of foreign nationals are studying in the University under various degree programmes. Those foreign students who stay outside the campus will have to adhere to certain code of conduct as mentioned below.

- They have to enter into a Rent Agreement with the owners of the accommodation and submit a copy of the same to the ISAC in the University
- They shall inform the local police about their residence
- Boys and girls should necessarily stay in separate accommodation
- They shall not consume any narcotic substance such as Marijuana, Heroin, Cocaine etc..... In case, they consume alcohol, they should necessarily have obtained permit for the same from competent authorities. Any violation would make them liable for disciplinary action from the concerned authorities.
- They should not play loud music in their accommodation which would serve as a nuisance to the neighbours. They should maintain cordial relations with their neighbours and shall live in harmony with them. Further, they should not indulge in any boisterous behavior such as getting into altercation with neighbours, causing disturbance to them etc... Moreover, they shall always maintain the social decorum by behaving politely, wearing appropriate attire so as to ensure the amicable living atmosphere with others.
- Whenever they leave town for any reason, they should necessarily inform the authorities in ISAC and also their counsellor.

Regulations for boarders residing in the university hostels: GENERAL:

- All students shall conform to the rules of good conduct and shall respect the authorities of the university.
- Students shall put in efforts to protect the property of the university and make proper use of the facilities provided.
- No student shall deface or destroy any university or public property.

- Students shall maintain proper decorum in all places such as classrooms, hostels, laboratories, sports facilities, transport facilities etc...
- Students shall not disturb the normal work of the university by disorderly conduct, boisterous behaviour and unauthorized assembly.
- Ragging in any form is strictly prohibited.
- Consumption of alcohol or drunkenness or drug addiction or gambling on the campus is strictly prohibited.
- Students should not indulge in celebration of any festivals on days other than those notified by the university.
- Violation of any of the regulations will be treated as an act of indiscipline and shall be brought to the notice of the Hostel Superintendent by the concerned student.
- The Hostel Superintendent in consultation with the concerned Rectors shall enquire into the matter and may implement immediate measures such as giving a warning, imposing a fine or debarring from the hostel for a period not exceeding one month.
- In further cases of serious indiscipline, an Inquiry cum Disciplinary Committee may be formed comprising officials in the university and the said Committee shall inquire into acts of indiscipline and suggest punitive measures to the Higher Authorities in the University.
- The decision of the higher authorities in the university in all these matters shall be final and binding on all concerned.
- The Rector of each hostel shall hold weekly open meetings with the boarders on designated day and time to address the grievances of the boarders, if any.
- Similar open meetings will be held by the Hostel Superintendent with the boarders once a month on designated day and time to address the grievances of the boarders, if any.

ADMISSION TO THE HOSTELS:

- Any student admitted to any institution in the university is eligible to be admitted to the concerned hostel subject to the availability of accommodation.
- Preference will be given to the regular students of the university.
- Application may be made to the Rector of the hostel on payment of prescribed application fees.

- The Rector of the hostel in consultation with the Hostel Superintendent shall allot rooms to the applicants depending upon the availability.

PAYMENT OF HOSTEL FEES

- Every boarder in the hostel shall pay the prescribed fees from time to time.
- The Hostel Fees will be decided by the Management of the Trust running the hostels. In case, the prescribed fees are not paid in time, the boarder shall have to pay the fine as decided by the Management of the Trust

BEHAVIOUR OF BOARDERS IN THE HOSTEL

- The boarders shall not change the room allotted to them by the Rector without the permission of the Rector.
- The boarders shall keep their rooms neat and tidy and shall cooperate with the hostel management in safe upkeep of the common utilities provided to them.
- The boarders shall allow the Rector to inspect their rooms whenever demanded.
- The corridors, toilets, reading room, TV room, mess etc... are common utilities provided by the hostel and it is the responsibility of every boarder to use them appropriately without causing any damage.
- The boarders themselves are responsible for the safety of their belongings and are advised not to keep any valuable items in their rooms.
- The boarders shall not consume prohibited substances such as alcohol, narcotics,
- Marijuana, Heroin, Cocaine etc. and shall not keep in their custody/hostel premises illegal objects/ materials such as firearms, missiles, bombs, narcotics, alcohol or other intoxicants etc.
- Smoking and chewing of tobacco is strictly prohibited.
- Gambling in any form is strictly prohibited.
- Viewing prohibited material on personal computers, laptops, mobile and other electronics devices will be strictly viewed as an act of indiscipline.
- No person other than the boarders shall be allowed to enter the hostel premises without the permission of the Rector.

- Boarders shall not allow any guests to stay overnight in their rooms.
- No boarder shall stay outside the hostel after 9:00 PM without prior permission of the Rector. However, boarders in the Ladies' Hostel shall not remain outside the hostel beyond 7:30 PM without prior permission of the Rector. Any violation of this provision shall be viewed seriously and disciplinary proceedings will be initiated.
- Boarders shall treat all employees of the hostel with courtesy and respect.
- Boarders shall not hold any unauthorized meeting in the hostel premises.
- Boarders shall vacate the hostel during vacations to facilitate upkeep of the hostels.
- Boarders shall wear proper dresses when they visit the common room, dining hall or any public place on the university campus.
- Any complaint or grievances which the boarders have shall be reported to the Rector who in turn shall bring it to the notice of the Hostel Superintendent immediately for redressal.

HOSTEL MESS

- There shall be as many number of messes as is required in the university premises.
- All meals, breakfast etc... will be served only in the mess.
- Boarders shall have food only in that mess to which they are allotted.
- The mess charges shall be collected along with the hostel fees as determined by the Trust.
- Boarders shall treat all mess workers with courtesy and respect.
- Food will not be taken out of the mess for any reason.
- Any complaints regarding the quality of food shall be brought to the notice of the concerned Rectors and Hostel Superintendent.
- The boarders shall strictly adhere to the timings of the mess.
- The boarders will have to be properly dressed while coming to the mess.

PEO's, PO's & PSO's

PEO 1 Apply computer science and engineering theories, principles, and skills to address societal challenges.

PEO 2 Display a lifelong learning mindset and adapt to quick technological developments in the sector.

PEO 3 Exhibit professionalism, collaboration, leadership abilities, and awareness of contemporary demands.

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

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

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

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

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

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

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

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

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


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

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




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

PSO 1 Demand as per recent development: An ability to analyze, design, verify, validate, code and maintain the solution of given problem to derive execution of software system.

PSO 2 Software skill: An ability to understand, apply and work with one or more domain using knowledge of mathematical techniques and principles with relevant areas of computer science.

Faculty of Engineering & Technology					Parul [®] University	NAAC A++ ACCREDITED UNIVERSITY
ACADEMIC CALENDAR FOR ODD TERM - YEAR : 2024 - 25						
Bachelor of Technology/Diploma Engineering/IEDP/M.Tech Courses (Reg Sem - III, V, VII)						
Week	MONDAY	Tuesday	Wednesday	Thursday	Friday	Saturday
01 June	10 Teaching Start	11	12	13	14	15
02	17	18	19	20	21	22
03	24	25	26	27	28	29 Weekly 1
04 July	01	02	03	04	05	06 Weekly 2
05	08	09	10	11	12	13 Weekly 3
06	15	16	17	18	19	20 Weekly 4
07	22	23	24	25	26	27 Weekly 5
08 July/Aug	29	30	31	01	02	03 Weekly 6
09	05 Mid Sem Exam	06 Mid Sem Exam	07 Mid Sem Exam	08 Mid Sem Exam	09 Mid Sem Exam	10 Mid Sem Exam
10	12	13	14	15 Independence Day	16	17
11	19 Rakshabandhan	20	21	22	23	24
12	26 Janmashtmi	27	28	29	30	31
13 September	02	03	04	05	06	07 Ganesh Chaturthi
14	09	10	11	12	13	14
15	16	17	18	19	20	21
16	23	24	25	26	27	28
17 Sept/Oct	30	01	02 Mahatma Gandhi Jayanti	03	04	05
18	07 TW Submission	08 TW Submission	09 TW Submission	10 TW Submission	11 TW Submission	12 Dussehra
19	14	15	16	17	18	19 Teaching End
20	21 ESE (Practical)	22 ESE (Practical)	23 ESE (Practical)	24 ESE (Practical)	25 ESE (Practical)	26 ESE (Practical)
21 Oct/Nov	28 Diwali Break	29 Diwali Break	30 Diwali Break	31 Diwali Break	01 Diwali Break	02 Diwali Break
22	04 Diwali Break	05 Diwali Break	06 Diwali Break	07 Diwali Break	08 Diwali Break	09 Diwali Break
23	11 ESE (Theory)	12 ESE (Theory)	13 ESE (Theory)	14 ESE (Theory)	15 ESE (Theory)	16 ESE (Theory)
24	18 ESE (Theory)	19 ESE (Theory)	20 ESE (Theory)	21 ESE (Theory)	22 ESE (Theory)	23 ESE (Theory)
Important Notes	1. Marks Locking date by HOD : 14 Oct, 2024 2. Marks Locking date by Principal and Dean : 15 Oct, 2024 3. End Sem Practical Dates : 21 Oct - 26 Oct, 2024 4. End Sem Theory Dates : 11 Nov - 23 Nov, 2024 5. End Sem Supplementary Exam Dates : 25 Nov, 2024 Onwards 6. New Term (Even) Commencement : 25 Nov, 2024 Onwards					 Dr. Vipul Vekariya Dean - Faculty of Engineering & Technology

TIME TABLE

PARUL UNIVERSITY							 NAAC GRADE C++
FACULTY NAME: FACULTY OF ENGINEERING & TECHNOLOGY							
INSTITUTE NAME: PARUL INSTITUTE OF ENGINEERING & TECHNOLOGY							
ACADEMIC YEAR: 2024-25					YEAR: 4TH YEAR		
SEMESTER:7TH					LEVEL: UG		
PROGRAM NAME: B.TECH COMPUTER SCIENCE ENGINEERING					DIVISION: CSE_7B20 CSE CE		
EFFECTIVE FROM: 10-06-2024							
TIME	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	
09:45 - 10:45	PROJECT	7B20:INS:AT2:D-405	LIBRARY/SELF STUDY	7B20:INS:AT2:D-408	7B20:ML:ASH::D-407	LIBRARY/SELF STUDY	
10:45 - 11:45		7B20:HPC:YB1:D-405		7B20:STQA:HR:D-408	7B20:STQA:HR:D-407		
11:45 - 12:45	RECESS TIME: 11:45 - 12:45						
12:45 - 01:35	PROJECT	LIBRARY/SELF STUDY	7B20:1:HPC:YB1:D-405	LIBRARY/SELF STUDY	LIBRARY/SELF STUDY	7B20:1:INS:AT2:D-419	
01:35 - 02:25			7B20:2:HPC:KSS1:D-405	7B20:HPC:YB1:D-407		7B20:2:INS:APB:D-419	
02:25 - 02:45	RECESS TIME: 02:25- 02:45						
02:45 - 03:45	PROJECT	7B20:INS:AT2 D-302	7B20:1:STQA:HR:D-302	7B20:ML:ASH:D-302	7B20:1:ML:RC:D-302 7B20:2:ML:ASH:D-302	7B20:STQA:HR:D-410	
03:45 - 04:45		7B20:HPC:YB1:D-302	7B20:2:STQA:BV1:D-302	7B20:CPS:VD:D-302		7B20:ML:ASH:D-410	
SUBJECT_CODE	SUBJECT_NAME	SHORT_NAME	FACULTY FULL_NAME	FACULTY SHORT NAME	EMAIL ID	MIS ID	
203105310	Information and Network security	INS	AJAY THATIPAMULA	AT2	ajay.thatipamula34220@paruluniversity.ac.in	34220	
203105311	Information and Network security Labora	INS LAB	AJAY THATIPAMULA	AT2	ajay.thatipamula34220@paruluniversity.ac.in	34220	
			Dr. Aparajita Biswal	APB	aparajita.biswal34355@paruluniversity.ac.in	34355	
203105395	Software Testing and Quality Assurance	STQA	Hiren Raiththa(HR)	HR	raiththa19387@paruluniversity.ac.inRuchika Ch	19387	
203105396	Software Testing and Quality Assurance	STQA LAB	Hiren Raiththa(HR)	HR	raiththa19387@paruluniversity.ac.inRuchika Ch	19387	
			BHAVESH VAGHELA	BV1	bhavesh.vaghela34353@paruluniversity.ac.in	34353	
203105425	Cyber Physical Systems	CPS	Dr.Vipul Dabhi	VD	vipulkumar.dabhi23496@paruluniversity.ac.in	23496	
203105428	High Performance Computing	HPC	Yamini Barge	YB1	yamini.barge26782@paruluniversity.ac.in	26782	
203105430	High Performance Computing Laboratory	HPC LAB	Yamini Barge	YB1	yamini.barge26782@paruluniversity.ac.in	26782	
	High Performance Computing Laboratory	HPC LAB	Dr. Kruti Sataria	KKS1	kruti.sataria25509@paruluniversity.ac.in	25509	
203105515	Machine Learning	ML	Dr. Ashwini jha(ASH)	ASH	ashwini.jha34918@paruluniversity.ac.in	34918	
203105403	Machine Learning Laboratory	ML LAB BATCH1	Ruchika Chouhan	RC	ruchika.chouhan24299@paruluniversity.ac.in	24299	
	Machine Learning Laboratory	ML LAB BATCH2	Dr. Ashwini jha(ASH)	ASH	ashwini.jha34918@paruluniversity.ac.in	34918	
CLASSROOM NO:			D-405, D-302, D-408, D-407, D-410			ABHISHEK KUMAR	
LAB/ TUTORIAL LOCATION:			D-405, D-302, D-419			abhishek.kumar13495@paruluniversity.ac.in	
SIGN		SIGN & SEAL			SIGN & SEAL		
							
DR. Daxa Vekariya		Dr. Amit Barve			Dr. Vipul Vekariya		
Time Table Coordinator		Head of Department			Principal / Dean		

PARUL UNIVERSITY

R/Circular-863/2023-24

Office of the Registrar
December 6, 2023**CIRCULAR****Sub: List of Holidays for the Calendar Year-2024****Ref: Orders of the President**

The following is the list of General Holidays for the year 2024.

Sr.No.	Name of Public Holiday	Date	Day
1	Vaasi Uttarayan	January 15, 2024	Monday
2	Republic Day	January 26, 2024	Friday
3	Maha Shivratri (Maha Vad 13)	March 08, 2024	Friday
4	Holi 2 nd Day-Dhuleti	March 25, 2024	Monday
5	Ramjan-Eid (Eid-UI-Fitra)	April 11, 2024	Thursday
6	Shree Ram Navmi	April 17, 2024	Wednesday
7	Independence Day / Parsi New Year Day-Pateti	August 15, 2024	Thursday
8	Raksha Bandhan	August 19, 2024	Monday
9	Janmashtami (Shravan Vad-28)	August 26, 2024	Monday
10	Samvatsari (Chaturthi Paksha)/ Ganesh Chaturthi	September 7, 2024	Saturday
11	Mahatma Gandhi's Birthday	October 2, 2024	Wednesday
12	Dussehra (Vijaya Dashmi)	October 12, 2024	Saturday
13	Diwali /Sardar Vallabhbhai Patel's Birthday	October 31, 2024	Thursday
14	Vikram Samvant New Year Day	November 2, 2024	Saturday
15	Christmas	December 25, 2024	Wednesday

Weekly exam	
29/06/24	Weekly - 1
06-07-24	Weekly - 2
13/07/24	Weekly - 3
20/07/24	Weekly - 4
27/07/24	Weekly - 5
03-08-24	Weekly - 6

Mid Exam
05/08/24 to 10/08/24

Term work submission
07/10/24 to 11/10/24

Practical exam
21/10/24 to 26/10/24

External Sem Exam
11/11/24 to 23/11/24

MFT DETAILS

DIV	FR Name	Contact Number	EMAIL ID
7B20	ABHISHEK KUMAR	8340192818	<u>abhishek.kumar19495@paruluniversity.ac.in</u>

Concerned Faculty List with Contact Details

SUBJECT_CODE	SUBJECT_NAME	SHORT_NAME	FACULTY FULL_NAME	FACULTY SHORT NAME	EMAIL ID	MIS ID
203105310	Information and Network security	INS	AJAY THATIPAMULA	AT2	ajay.thatipamula34220@paruluniversity.ac.in	34220
203105311	Information and Network security Laborator	INS LAB	AJAY THATIPAMULA	AT2	ajay.thatipamula34220@paruluniversity.ac.in	34220
			Dr. Aparajita Biswal	APB	aparajita.biswal34355@paruluniversity.ac.in	34355
203105395	Software Testing and Quality Assurance	STQA	Hiren Raiththa(HR)	HR	hiren.raithatha19387@paruluniversity.ac.inRuchika Chouha	19387
203105396	Software Testing and Quality Assurance Laborator	STQA LAB	Hiren Raiththa(HR)	HR	hiren.raithatha19387@paruluniversity.ac.inRuchika Chouha	19387
			BHAVESH VAGHELA	BV1	bhavesh.vaghela34353@paruluniversity.ac.in	34353
203105425	Cyber Physical Systems	CPS	Dr.Vipul Dabhi	VD	vipulkumar.dabhi23496@paruluniversity.ac.in	23496
203105428	High Performance Computing	HPC	Yamini Barge	YB1	yamini.barge26782@paruluniversity.ac.in	26782
203105430	High Performance Computing Laboratory	HPC LAB	Yamini Barge	YB1	yamini.barge26782@paruluniversity.ac.in	26782
	High Performance Computing Laboratory	HPC LAB	Dr. Kruti Sutariya	KKS1	kruti.sutaria25509@paruluniversity.ac.in	25509
203105515	Machine Learning	ML	Dr. Ashwini jha(ASH)	ASH	ashwini.jha34918@paruluniversity.ac.in	34918
203105403	Machine Learning Laboratory	ML LAB BATCH1	Ruchika Chouhan	RC	ruchika.chouhan24299@paruluniversity.ac.in	24299
	Machine Learning Laboratory	ML LAB BATCH2	Dr. Ashwini jha(ASH)	ASH	ashwini.jha34918@paruluniversity.ac.in	34918

SYLLABUS OF THE COURSES



Parul[®]
University

Teaching & Examination Scheme

ENGG & TECH - BTech - CE - 2021-22 - Semester: 7

Lect - Lecture, **Tut** - Tutorial, **Lab** - Lab, **SEE** - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Theory Passing % : 40 Practical Passing % : 50

Semester - 7												
Subjects					Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Code	Name	Type	Credit	Lect	Tut	Lab	External Marks	Internal Marks	External Marks	Internal Marks	
1	203105310	Information and Network security		3	3	0	0	60	40	-	-	100
2	203105311	Information and Network security Laboratory		1	0	0	2	-	-	30	20	50
3	203105395	Software Testing & Quality Assurance		3	3	0	0	60	40	-	-	100
4	203105396	Software Testing & Quality Assurance Laboratory		1	0	0	2	-	-	30	20	50
5	203105400	Project - 2		6	0	0	2	-	-	100	100	200
6	203105402	Summer Internship*		2	0	0	0	-	-	-	100	100
7		Open Elective 02		3	3	0	0	60	40	-	-	100
8		PEC 03		3	3	0	0	60	40	-	-	100
8		PEC 03		3	3	0	0	60	40	-	-	100
9		PEC 03-LAB		1	0	0	2	-	-	30	20	50
10		PEC 04		3	3	0	0	60	40	-	-	100
11		PEC 04-LAB		1	0	0	2	-	-	30	20	50
Total				27	15	0	10					1000

Semester - 7 : Open Elective 02 (Select any one of the course)

Subjects					Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Code	Name	Type	Credit	Lect	Tut	Lab	External Marks	Internal Marks	External Marks	Internal Marks	
1	203105421	Remote Sensing and Geo Informatics		3	3	0	0	60	40	-	-	100
2	203105423	Real Time Systems		3	3	0	0	60	40	-	-	100
3	203105425	Cyber Physical Systems		3	3	0	0	60	40	-	-	100
4	203105427	Computational Number Theory		3	3	0	0	60	40	-	-	100
5	203105429	VLSI System Design		3	3	0	0	60	40	-	-	100

Semester - 7 : PEC 03 (Select any one of the course)

Subjects					Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Code	Name	Type	Credit	Lect	Tut	Lab	External Marks	Internal Marks	External Marks	Internal Marks	
1	203105408	Blockchain		3	3	0	0	60	40	-	-	100
2	203105415	Augmented and Virtual Reality		3	3	0	0	60	40	-	-	100
3	203105515	Machine Learning		3	3	0	0	60	40	-	-	100

Semester - 7 : PEC 03-LAB (Select any one of the course)



Subjects					Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Code	Name	Type	Credit	Lect	Tut	Lab	Externa l Marks	Interna l Marks	Externa l Marks	Interna l Marks	
1	203105403	Machine Learning Laboratory		1	0	0	2	-	-	30	20	50
2	203105409	Blockchain Laboratory		1	0	0	2	-	-	30	20	50
3	203105416	Augmented and Virtual Reality Laboratory		1	0	0	2	-	-	30	20	50

Semester - 7 : PEC 04 (Select any one of the course)

Subjects					Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Code	Name	Type	Credit	Lect	Tut	Lab	Externa l Marks	Interna l Marks	Externa l Marks	Interna l Marks	
1	203105428	High performance computing		3	3	0	0	60	40	-	-	100
2	203105439	Wireless Sensor Network		3	3	0	0	60	40	-	-	100
3	203105443	Big Data Analytics		3	3	0	0	60	40	-	-	100

Semester - 7 : PEC 04-LAB (Select any one of the course)

Subjects					Contact Hours/Week			Theory Marks		Practical/Viva Marks		Total Marks
Sr.	Code	Name	Type	Credit	Lect	Tut	Lab	Externa l Marks	Interna l Marks	Externa l Marks	Interna l Marks	
1	203105348	Big Data Analytics Laboratory		1	0	0	2	-	-	30	20	50
2	203105430	High performance computing Laboratory		1	0	0	2	-	-	30	20	50
3	203105440	Wireless Sensor Network - Laboratory		1	0	0	2	-	-	30	20	50

Summary

Total No. of Subjects	Total No. of Subjects Offered (Including Electives)	Total Credits
11	23	27

Course: BTech

Prerequisite: Data Structure, Networking, OOP |

Semester: 7

203105408 - Blockchain

Rationale: This course is intended to study the basics of Blockchain technology. During this course learners will explore various aspects of Blockchain technology like application in various domains. By implementing, learners will have ideas about private and public Blockchain, and smart contracts.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	0	3	20	20	-	60	-	100

SEE - Semester End Examination, **CIA** - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content
W - Weightage (%) , **T** - Teaching hours

Sr.	Topics	W	T
1	Introduction to Blockchain fundamentals Introduction, History and Origin of blockchain, what is blockchain, Importance, Properties, Applications, Types of Blockchain, Blockchain as a distributed Ledger, Centralized vs Distributed Ledger, Advantages of DL, Immutable Ledger, How DL works, Blockchain Network, Components of Blockchain: Blocks, Blockchain, Genesis Block, Hash, Nonce, Mining Process.	20	7
2	Cryptographic concepts in Blockchain Content Summary: Use of Cryptography Primitives in Blockchain, Security Services and Security Mechanisms, Hashing, Hash Functions, SHA512, Digital Signature, Signing and Verification of Signature, Merkle Tree. .	15	7
3	Distributed Consensus Content Summary: Distributed systems, Consensus decision-making, Blockchain Consensus, Blockchain Nodes: Light nodes, Full Nodes, Mining Nodes, Byzantine Generals Problem, Byzantine Fault Tolerance, Practical and Federated BFT, Consensus Algorithms: Proof of Work, Proof of Stake, Proof of Work v Stake, Delegated Proof of Stake, Proof of Importance, Proof of Elapsed Time, Proof of Capacity, Proof of Authority, RAFT, 51% Attack, Forking, Hard and Soft Forking: Case Studies	20	8
4	Cryptocurrency Content Summary: Introduction to Bitcoin, History of Bitcoin, Bitcoin elements, How bitcoin functions, Cryptography in Bitcoins, hash function, Elliptic key Cryptography, Digital signature, Establishing ownership, Bitcoin addition, Wallets, Bitcoin Wallets, Transactions, Constructing a transaction, Bitcoin script, Locking and unlocking, Network Architecture, Mining, CAP theorem, Weaknesses in Bitcoin	20	9
5	Smart Contracts and its potential uses Content Summary: Traditional Contracts vs Smart Contracts, Properties of smart contracts, How smart contract works, Platforms for implementing smart contracts, Resources required, Use cases, Overview of Ethereum, Ethereum vs. Bitcoin, Logic and Challenges of Smart Contracts, Smart contract programming architecture, Solidity and remix, using smart contracts to enforce legal contracts.	15	6
6	Introduction to Blockchain platforms Content Summary: Ethereum, Hyperledger, IBM Blockchain, Multichain, Hydrachain, Ripple, R3 Corda, BigChainDB, IPFS, Dapps	10	3

Reference Books

1.	Mastering Blockchain (TextBook) By Imran Bashir Packt 1st Edition, Pub. Year 2017
2.	Blockchain Technology (TextBook) By Chandramouli Subramanian, Asha George, Abhilash K A and Meena Karthikeyan , Universities Press
3.	Blockchain For Dummies By Tiana Laurence, Wiley Publication
4.	Blockchain Blueprint for a New Economy By Melanie Swan, O'Reilly Publication

Course Outcome

After Learning the Course the students shall be able to:

1. Develop a workable knowledge of basic concepts of blockchain technology and its underlying mechanisms.
2. Understand cryptographic primitives in blockchain and its impact on implementation related decisions.
3. Review the principles behind various consensus mechanism models
4. Define a currency and analyze the workflow behind bitcoin.
5. Determine smart contract use cases and deploy a minimalist blockchain application.
6. Understand and get familiar with different blockchain platforms.

Course: BTech

Prerequisite: Data Structure, Networking, OOP | 203105408 - Blockchain

Semester: 7

Rationale: This course is intended to study the basics of Blockchain technology. During this course learners will explore various aspects of Blockchain technology like application in various domains. By implementing, learners will have ideas about private and public Blockchain, and smart contracts.

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	0	1	-	-	20	-	30	50

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Outcome

After Learning the Course the students shall be able to:

1. Develop a workable knowledge of basic concepts of blockchain technology and its underlying mechanisms.
2. Understand cryptographic primitives in blockchain and its impact on implementation related decisions.
3. Review the principles behind various consensus mechanism models
4. Define a currency and analyze the workflow behind bitcoin.
5. Determine smart contract use cases and deploy a minimalist blockchain application.
6. Understand and get familiar with different blockchain platforms.

List of Practical

1.	Demonstrate Blockchain characteristics [DIT].
2.	Introduction to ETHEREUM tools and Solidity
3.	Deploy a smart contract for printing "Hello World" using Java Script VM, Injected Web3 and Web3Provider using Metamask and Ganache.
4.	Deploy a smart contract for arithmetic operations using Java Script VM, Injected Web3 and Web3Provider using Metamask and Ganache.
5.	Deploy a smart contract for FINDING LARGEST NUMBER OUT OF THREE NUMBERS using Java Script VM, Injected Web3 and Web3Provider using Metamask and Ganache.
6.	Create a Smart Contract for a banking application in solidity which allows users to do the following: Mint money into your account Withdraw money from your account Send money from your account to smart contract address Check balance After a contract is created, deploy the contract on Ethereum Testnet network.
7.	How to build a smart contract that lets user book rooms and pay for them with cryptocurrency.
8.	Deploy a smart contract using MyEtherWallet (MEW).
9.	Deploy the smart contract for RAFFLE DRAW GAME
10.	Deploy Smart Contract for E-Voting.

Prerequisite: Software Engineering Basics, Basics of Java Programmin

Rationale: To study pioneer of Software Development Life Cycle, Development models and Agile Software development. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing. To learn the process of improve the quality of software work products. To gain the techniques and skills on how to use modern software testing tools to support software testing projects. To expose Software Process Improvement and Reengineering

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/	Tutorial Hrs/	Lab Hrs/	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	-	3	20	20	-	60	-	100

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Software Testing Testing, Verification and Validation, Test Strategies for Conventional and Object-Oriented Software, Unit Testing, Integration Testing, Validation Testing, Alpha and Beta Testing, System Testing, Recovery Testing, Security Testing, Stress Testing, Performance Testing, Metrics for Source Code, Metrics for Testing, Debugging Process, Debugging Strategies	15	8
2	Testing Techniques Software Testing Fundamentals, Black Box and White Box Testing, Basis Path Testing, Flow Graph Notation, Independent Program Paths, Graph Matrices, Control Structure Testing, Condition Testing, Data Flow Testing, Loop Testing, Graph Based Testing Methods, Equivalence Partitioning, Boundary Value Analysis.	15	8
3	Object Oriented Testing Methods Applicability of Conventional Test Case Design Methods, Issues in Object Oriented Testing, Fault-Based Testing, Scenario-Based Testing, Random Testing and Partition Testing for Classes, InterClass Test Case Design	20	8
4	Testing Process and Specialized Systems Testing Test Plan Development, Requirement Phase, Design Phase and Program Phase Testing, Testing Client/Server Systems, Testing Web based Systems, Testing Off-the-Shelf Software, Testing in Multiplatform Environment, Testing for Real Time Systems, Testing Security.	15	8
5	Software Quality Assurance Concepts and Standards Quality Concepts, Quality Control, Quality Assurance, SQA Activities, Software Reviews, Formal Technical Reviews, Review Guidelines, Software Reliability, Software Safety, Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, TQM, Six Sigma, SPICE, Software Quality Assurance Metrics	20	8
6	Risk Management and Change Management Software Risks, Risk Identification, Risk Projection, Risk Refinement, The RMMM Plan, Software Configuration Management, Baselines, Software Configuration Items, SCM Process: Version Control, Change Control, Configuration Audit, Configuration Management for Web Engineering.	15	8

Reference Books

1.	Software Engineering By R. Pressmen 6th
2.	Software testing By Yogesh Singh Cambridge University Press, 2012
3.	Effective Methods for Software Testing By William Perry

Course Outcome

After Learning the Course the students shall be able to:

1. Prepare SRS (Software Requirement Specification) document and SPMP (Software Project Management Plan) document.
2. Apply the concept of Functional Oriented and Object Oriented Approach for Software Design.
3. Recognize how to ensure the quality of software product, different quality standards and software review techniques.
4. Apply various testing techniques and test plan in.
5. Understand modern Agile Development and Service Oriented Architecture Concept of Industry.



Course: BTech

Semester: 7

Prerequisite: Software Engineering Basics, Basics of Java Programming

Rationale: To study pioneer of Software Development Life Cycle, Development models and Agile Software development. To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods. To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing. To learn the process of improve the quality of software work products. To gain the techniques and skills on how to use modern software testing tools to support software testing projects. To expose Software Process Improvement and Reengineering

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/	Tutorial Hrs/	Lab Hrs/	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	-	1	-	-	20	-	30	50

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

List of Practicals

Sr.	Experiments		
1	Design test cases using Boundary value analysis		
2	Design test cases using Equivalence class partitioning		
3	Design independent paths by calculating cyclomatic complexity using date problem		
4	Design test cases using Decision table		
5	Design independent paths by taking DD path using date problem		
6	Understand The Automation Testing Approach (Theory Concept)		
7	Using Selenium IDE, Write a test suite containing minimum 4 test cases		
8	Install Selenium server and demonstrate it using a script in Java/PHP		
9	Write and test a program to login a specific web page.		
10	Write and test a program to provide total number of objects present / available on the page.		
11	Write and test a program to update 10 student records into table into Excel file.		

Course Outcome

After Learning the Course the students shall be able to:

1. Prepare SRS (Software Requirement Specification) document and SPMP (Software Project Management Plan) document.
2. Apply the concept of Functional Oriented and Object Oriented Approach for Software Design.
3. Recognize how to ensure the quality of software product, different quality standards and software review techniques.
4. Apply various testing techniques and test plan in.
5. Understand modern Agile Development and Service Oriented Architecture Concept of Industry.

Course: BTech

Semester: 7

Prerequisite: Students should be familiar with basic concepts of Software Flaws, Data Structures, and Mathematics including Random numbers, Number theory, and finite fields. | 203105205 - Data Structure and Algorithms

Rationale: This course provides an introduction to the fundamental principles of cryptography and its applications on the network security domain as well as software development domain. This subject covers various important topics concern to information security like symmetric and asymmetric cryptography, hashing, message and user authentication, digital signatures, key distribution and overview of the malware technologies. The subject also covers the applications of all of these in real life situations

Teaching and Examination Scheme										
Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	0	3	20	20	-	60	-	100

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content

W - Weightage (%) , T - Teaching hours

Sr.	Topics	W	T
1	Introduction Computer Security Concept, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanism, A Model for Network Security.	5	2
2	Classical Encryption Techniques Symmetric Cipher Model, Cryptanalysis, Cryptanalysis Attacks, Substitution Techniques: Caesar Cipher, Monoalphabetic Cipher, Hill Cipher, Playfair Cipher, Polyalphabetic Cipher, OTP, Transposition Techniques, Steganography	10	6
3	Block Ciphers and the Data Encryption Standard Stream ciphers and block ciphers, Block Cipher Principles, Data Stream ciphers and block ciphers, Confusion & Diffusion, Block Cipher Principles, Data Encryption Standard (DES), Differential and Linear Cryptanalysis, Avalanche Effect, strength of DES, Design principles of block cipher.	15	8
4	Multiple Encryption and Triple DES Multiple encryption and triple DES, Electronic Code Book, Cipher Block Chaining Mode, Cipher Feedback mode, Output Feedback mode, Counter mode	10	4
5	Number theory and Advance Encryption Standard The Euclidean Algorithm, Modular Arithmetic, Finite Fields of the Form GF(p), Polynomial Arithmetic, Advance Encryption Standard(AES): structure, key expansion	15	6
6	Asymmetric Ciphers Prime Numbers, Principles of Public-Key Cryptosystems, The RSA Algorithm, Diffie Hellman Key Exchange, Man in the Middle attack	15	4
7	Cryptographic Data Integrity Algorithms Hash Function: Hash Function and its Application, Security Requirements for Cryptographic Hash Functions, Hash Functions Based on Cipher BlockChaining, Secure Hash Algorithm (SHA). MAC: Message Authentication Requirements, Message Authentication Functions, Requirements for Message Authentication Codes, Security of MACs, HMAC Digital Signature: Introduction to Digital Signatures, Digital Signature	20	8



	Standard.		
8	Key Management and Distribution Symmetric Key Distribution: Symmetric Key Distribution Using Symmetric Encryption, Symmetric Key Distribution Using Asymmetric Encryption, Asymmetric Key Distribution: Distribution of Public Keys, X.509 certificates Advanced Topics: Firewall, Intruders, Virus, Trojans, Malware, Ransomware.	10	4

Reference Books

1.	Cryptography and Network Security (TextBook) By William Stallings Pearson Education
2.	Cryptography & Network Security By Behrouz A. Forouzan Tata McGraw-Hill
3.	Information Security Principles and Practice By Deven Shah, Wiley-India
4.	Information Security Principles and Practice By Mark Stamp, Wiley India Edition
5.	Information systems security By Nina Godbole Wiley Publications, 2008

Course Outcome

After Learning the Course the students shall be able to:

After Learning the course, the students shall be able to:

1. Define the concepts of Information security and their use.
2. Describe the principles of symmetric and asymmetric cryptography. Understand the concepts of hashing with algorithms and apply them.
3. Understand and use message authentication and its requirement.
4. Understand the concepts of digital signature and digital certificates.
5. Understand and use the various key management and remote authentication mechanisms.
6. Understand the concept of system and software security. Understand vulnerabilities in software flaws and concept of malware

Miscellaneous

Exam Requirement

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc

Course: BTech

Semester: 7

Prerequisite: Students should be familiar with basic concepts of Software Flaws, Data Structures, and Mathematics including Random numbers, Number theory, and finite fields | 203105205 - Data Structure and Algorithms

Rationale: This course introduces the fundamental principles of cryptography and its applications in the network security domain as well as the software development domain. This subject covers various important topics concerned with information security like symmetric and asymmetric cryptography, hashing, message and user authentication, digital signatures, key distribution, and an overview of the malware technologies. The subject also covers the applications of all of these in real-lifesituations.

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Teaching and Examination Scheme

Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	0	1	-	-	20	-	30	50

Course Outcome

After Learning the Course the students shall be able to:

- After Learning the course, the students shall be able to:
1. Define the concepts of Information security and their use.
 2. Describe the principles of symmetric and asymmetric cryptography. Understand the concepts of hashing with algorithms and apply them.
 3. Understand and use message authentication and its requirement.
 4. Understand the concepts of digital signature and digital certificates.
 5. Understand and use the various key management and remote authentication mechanisms.
 6. Understand the concept of system and software security. Understand vulnerabilities in software flaws and concept of malware

List of Practical

1.	Practical-1 Implement Caesar cipher encryption-decryption
2.	Practical-2 Implement Monoalphabetic cipher encryption-decryption
3.	Practical-3 Implement Playfair cipher encryption-decryption
4.	Practical-4 Implement Polyalphabetic cipher encryption-decryption
5.	Practical-5 Implement Hill cipher encryption-decryption
6.	Practical-6 Implement Simple Transposition encryption-decryption
7.	Practical-7 Implement One time pad encryption-decryption
8.	Practical-8 Implement Diffi-Hellmen Key exchange Method
9.	Practical-9 Implement RSA encryption-decryption algorithm
10.	Practical-10 Demonstrate working of Digital Signature using Cryptool

session	week	unit	topics	course Learning outcomes
1	1		1 Computer Security Concept, The OSI Security Architecture, Security Attacks	to know the concept of information network security, osi security architecture, and security attacks
2			Security Services, Security Mechanism, A Model for Network Security.	to understand the concept of security servicesw, security mechanism and model for network security
3			2 Classical Encryption Techniques: Symmetric Cipher Model, Cryptanalysis, Cryptanalysis Attacks	to understand the the concept of classical encryption techniques, symmetric cipher model, cryptanalysis, and attacks
4	2		Cryptanalysis Attacks	explain in briuf cryptanalysis attacks
5			Substitution Techniques: Caesar Cipher	to undertand Substitution Techniques: Caesar Cipher
6			Monoalphabetic Cipher	to understand the concept of Monoalphabetic Cipher
7	3		Playfair Cipher, Polyalphabetic Cipher,	to undestand playfair cipher, polyaphabetic cipher
8			OTP, Transposition Techniques, Steganography	to know basic terms about OTP, Transposition Techniques, Steganography
9			3 Block Ciphers and the Data Encryption Standard:Stream ciphers and block ciphers	to understand Block Ciphers and the Data Encryption Standard:Stream ciphers and block ciphers
		Mid Term		
10	4		Block Cipher Principles	to learn about Block Cipher Principles
11			Data Stream ciphers and block ciphers	to understand Data Stream ciphers and block ciphers
12			Confusion & Diffusion,Block Cipher Principles	learn about Confusion & Diffusion and Block Cipher Principles
13	5		Data Encryption Standard (DES)	to understand the concept of Data Encryption Standard (DES)
14			Deferential and Linear Cryptanalysis,Avalanche Effect,	to learn basic terms Deferential and Linear Cryptanalysis,Avalanche Effect,
15			strength of DES, Design principles of block cipher.	to understand DES, and design principles of block cipher
16	6		strength of DES, Design principles of block cipher.	
17			4 Multiple Encryption and Triple DES	to learn about multiple encryption techniques and triple DES
18			Electronic Code Book, Cipher Block Chaining Mode	to learn electronic code book and cipher chaining mode
19	7		Cipher Feedback mode	
20			Output Feedback mode	to understand cipher feedback mode
21			Counter mode	to learn about counter mode
22			5 Number theory and Advance Encryption Standard:The Euclidean Algorithm,	to lern about number theory, adnavce encryption standard and the euclidean algorithm

Course: BTech

Semester: 7

Prerequisite: Data structure, automata and language theory, Mathematics and Python programming. |

Rationale: This course provides a broad introduction to Artificial Intelligence. AI techniques for search and knowledge representation also apply knowledge of AI planning and machine learning techniques to real-world problems.

Teaching and Examination Scheme										
Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
3	0	0	-	3	20	20	-	60	-	100

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Content	W - Weightage (%) , T - Teaching hours
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Sr.	Topics	W	T
1	Introduction to Machine Learning: Introduction to Machine Learning – Learning Paradigms – PAC learning – Basics of Probability – Version Spaces.	10	3
2	Supervised Learning – I: Linear and Non-Linear examples – Multi-Class & Multi-Label classification – Linear Regression – Multilinear Regression – Naïve Bayes Classifier – Decision Trees – ID3 – CART – Error bounds	15	6
3	Supervised Learning - II: K-NN classifier – Logistic regression – Perceptrons – Single layer & Multi-layer – Support Vector Machines – Linear & Non-linear.	25	9
4	Unsupervised Learning: Clustering basics (Partitioned, Hierarchical and Density based) - K-Means clustering – K-Mode clustering – Self organizing maps – Expectation maximization – Principal Component Analysis.	20	8
5	Evaluation Metrics: ROC Curves, Evaluation Metrics, Significance tests – Error correction in Perceptrons	10	5
6	Ensemble Learning: Bagging and Boosting (Random forests, Adaboost, XG boost inclusive)	10	6
7	Machine Learning in Practice: Data collection – Preprocessing (Missing values, Normalization, Adopting to chosen algorithm etc.) – Outlier Analysis (Z-Score) - Model selection & evaluation – Optimization of tuning parameters – Setting the environment – Visualization of results	10	6

Reference Books	
1.	Ethem Alpaydin, "Introduction to Machine Learning", MIT Press, Prentice Hall of India, Third Edition 2014. (TextBook)
2.	Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar "Foundations of Machine Learning", MIT Press, 2012
3.	Tom Mitchell, —Machine Learning, McGraw Hill, 3rd Edition, 1997.
4.	Charu C. Aggarwal, —Data Classification Algorithms and Applications, CRC Press, 2014.
5.	Christopher M. Bishop, —Pattern Recognition and Machine Learning, Springer 2011 Edition.



Course Outcome

After Learning the Course the students shall be able to:

Expected Course Outcome:

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

1. Understand, visualize, analyze and preprocess the data from a real-time source.
2. Apply appropriate algorithm to the data.
3. Analyze the results of algorithm and convert to appropriate information required for the real – time application.
4. Evaluate the performance of various algorithms that could be applied to the data and to suggest most relevant algorithm according to the environment.

Course: BTech

Semester: 7

Prerequisite: Data structure, automata and language theory, Mathematics and Python programming. | 203105403 - Machine Learning Laboratory

Rationale: This course provides a broad introduction to Artificial Intelligence. AI techniques for search and knowledge representation also apply knowledge of AI planning and machine learning techniques to real-world problems.

Teaching and Examination Scheme										
Teaching Scheme					Examination Scheme					Total
Lecture Hrs/Week	Tutorial Hrs/Week	Lab Hrs/Week	Hrs/Week	Credit	Internal Marks			External Marks		
					T	CE	P	T	P	
0	0	2	0	1	-	-	20	-	30	50

SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)

Course Outcome
After Learning the Course the students shall be able to:
1. Discover the basic issues and challenges in Machine Learning including data and model selection and its complexity
2. Understand the underlying mathematical relations within and across Machine Learning algorithms
3. Assess the different Supervised Learning algorithms using a suitable Dataset.
4. Evaluate the different unsupervised Learning algorithms using a suitable Dataset.
5. Design and implement different machine learning algorithms in a range of real-world applications.

List of Practical
1. Write a program to demonstrate the working of the decision tree-based ID3 algorithm.
2. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
3. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering a few test data sets.
4. Assuming a set of documents that need to be classified, use the naïve Bayesian Classifier model to perform this task.
5. Write a program to construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set.
6. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using k-Means algorithm.
7. Write a program to implement the K-Nearest Neighbour algorithm to classify the iris data set.
8. Implement linear regression and logistic regression.
9. Compare the various supervised learning algorithm by using appropriate dataset.
10. Compare the various Unsupervised learning algorithm by using the appropriate datasets.

Faculty of Engineering & Technology
Parul Institute of Engineering & Technology (BTech)
Deep Learning and Natural Language Processing (203105476)
Lesson Planning (7th Semester)

Artificial Intelligence Course File**I. COURSE OVERVIEW:**

Natural language processing (NLP) is a crucial part of artificial intelligence (AI). This course will introduce about the core concepts related to Natural Language Processing and its applications. A broad introduction about incorporation of Deep Learning techniques in Natural Language Processing is considered.

II. PREREQUISITE:

- a. Basics of Python
- b. Machine Learning

III. COUSE OUTCOME:

S.No	Description	Bloom's Taxonomy Level
1	Grasp basic NLP techniques, comprehend neural network architecture, and their applications in deep learning for NLP tasks	Knowledge, Understand (Level1, Level2)
2	Analyse the importance of RNNs and LSTMs in sequential data processing for NLP	Apply, Create (Level 2)
3	Investigate recent developments in Chatbot technologies	Apply, Create, Analyze (Level 2, Level 3)
4	Implement sentiment analysis methods and evaluate performance on datasets	Knowledge, Understand (Level1, Level2)

HOW PROGRAM OUTCOMES ARE ASSESSED

Program Outcomes (PO)		Level	Proficiency assessed by
PO1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems related to Computer Science and Engineering.	3	Assignments
PO2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems related to Computer Science and Engineering and reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	Assignments
PO3	Design/development of solutions : Design solutions for complex engineering problems related to Computer Science and Engineering and design system components or processes that meet the specified	2	Assignments

	needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.		
PO4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	2	Assignments
PO5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	--	--
PO6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the Computer Science and Engineering professional engineering practice.	1	Assignments
PO7	Environment and sustainability: Understand the impact of the Computer Science and Engineering professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	-	--
PO8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	-	--
PO9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	3	Case Studies
PO10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	-	--
PO11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.	3	Case Studies
PO12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.	2	Research

COURSE PLAN (WEEK-WISE):

Session	Week	Unit	Topics	Course Learning Outcomes
1	1	1	Overview of NLP: Historical Background and Waves	
2			Challenges in NLP and Objectives	
3			Common Terms in NLP	
4	2		Basics of NLP Operations: Word Level Analysis	
5			Syntactic Analysis and Semantic Analysis	
6			Word Sense Disambiguation and Discourse Processing	
7	3		Part of Speech (PoS) Tagging, Introduction to Natural Language Inception and Information Retrieval Applications of NLP <ul style="list-style-type: none"> Develop a part-of-speech tagging system using a pre-trained model and evaluate its performance on a dataset 	
8		2	Basics of Deep Learning, Structure of Neural Networks	
9			Activation Function in Neural Network	
10			Activation Function in Neural Network in brief with Example	
11			Types of Neural Networks: Feedforward NN	
12			Convolutional Neural Networks (CNNs) with example	
13			Recurrent Neural Networks (RNNs) with example	
14	5		Encoder-Decoder Networks with example	
15			Recursive and Multilayer Neural Network with example	
16			Optimization Algorithms : SGD and Back Propagation	
17	6	3	Introduction to Word Embedding	
18			Introduction to Word2Vec: CBOW and Skip-Gram Method	
19			Glove embedding and Cross-lingual Word embedding Model	
20			Softmax Approximation Introduction and theory	
21			Softmax Approximation examples	
22			Mechanism of RNN with Example(Feed-Forward and Back-propagation with Example)	
23	8		Difference Between RNN and Feed-Forward Explain with Example	
24			Recurrent Mechanism and Differences from Feedforward NNs	
25			Basics of RNNs	
26	9		RNNs in NLP	
27			RNN Techniques with Example <ul style="list-style-type: none"> Build a simple recurrent neural network (RNN) for language modeling using TensorFlow or PyTorch. Explain the challenges of vanishing and exploding gradients in RNN training and potential solutions. Develop a sequence-to-sequence model for machine translation using LSTM (Long Short-Term Memory) cells. 	
28	10	5	Chatbot Development and Case studies Develop a	
29			Small chatbot for Practice	

30				
31	11		<ul style="list-style-type: none"> Discuss the ethical considerations involved in chatbot development, such as privacy, bias, and accountability. Explore the potential applications of chatbots in various industries, such as customer service, healthcare, and education. Compare different chatbot platforms and frameworks, such as Dialogflow, Rasa, and Microsoft Bot Framework. 	
32		6	Advanced Sentiment Analysis	
33			Document Level Sentiment Analysis	
34	12		Sentence Level Sentiment Analysis	
35			Develop a Small model of Sentiment Analysis <ul style="list-style-type: none"> Build a sentiment analysis model using convolutional neural networks (CNNs) for sentence-level classification. Implement a recurrent neural network (RNN) with LSTM cells for aspect-level sentiment analysis. Discuss techniques for fine-grained sentiment analysis, such as emotion detection and opinion mining. 	
36		7	What are the key differences between rationalism and empiricism in the context of NLP? Discuss some of the major challenges in natural language processing.	
37	13		<ul style="list-style-type: none"> Implement a simple information retrieval system using TF-IDF (Term Frequency-Inverse Document Frequency) scoring. 	
38			<ul style="list-style-type: none"> Build a basic neural network model using TensorFlow or PyTorch for a classification task. Compare and contrast different activation functions such as ReLU, Sigmoid, and Tanh in terms of their advantages and disadvantages. Explain the concept of backpropagation and its role in training neural networks. 	
39			<ul style="list-style-type: none"> Implement a feedforward neural network for image classification using a popular dataset like MNIST or CIFAR-10. Describe the architecture of a convolutional neural network (CNN) and its applications in computer vision. Discuss the challenges of training recurrent neural networks (RNNs) and potential solutions. 	
40	14		<ul style="list-style-type: none"> Build an encoder-decoder network for sequence-to- sequence translation using attention mechanisms. Explain how recursive neural networks can be used for hierarchical structure modeling in natural language processing tasks. Develop a multilayer neural network for a regression task and evaluate its performance on a real-world dataset. 	
41			<ul style="list-style-type: none"> Implement stochastic gradient descent (SGD) from scratch and compare its performance with a library implementation on a regression task. 	

23	8		Modular Arithmetic, Finite Fields of the Form $GF(p)$	
24			Polynomial Arithmetic,	
25	9			to understand Structure of Advance Encryption Standard
26			Advance Encryption Standard(AES):structure	
27			key expansion	
28	10		Asymmetric Ciphers:Prime Numbers,	to lern about Asymmetric Cipher
29			Principles of Public-Key Cryptosystems,	to lern Principles of Public-Key Cryptosystems
30			The RSA Algorithm,	to understd the RSA algorithm
31	11		Diffie Hellman Key Exchange, Man in the Middle attack	to understand diffie hellman key Exchange and man in the middle attack
32			Cryptographic Data Integrity Algorithms: Hash Function: Hash Function and its Application, Security	learn about different cryptographic data integrity algorithms and exaples
33			Requirements for Cryptographic Hash Functions	to understand cryptographic hash function
34	12		Hash Functions Based on Cipher BlockChaining	
35			Secure Hash Algorithm (SHA).	to learn different algorithms like hash algorithm, MAC, HMAC and their security
36			MAC: Message Authentication Requirements, Message Authentication	
37	13		Functions, Requirements for Message Authentication Codes	to learn basic about digital signature
38			Security of MACs, HMAC	
39			Digital Signature: Introduction to Digital Signatures	
40	14		Symmetric Key Distribution: Symmetric Key Distribution Using Symmetric Encryption	to understand symmetric key distribution and key distribution techniques
41			Symmetric Key Distribution Using Asymmetric Encryption	explain about Symmetric Key Distribution Using Asymmetric Encryption
42			Asymmetric Key Distribution: Distribution of Public Keys,	ecplain about Asymmetric Key Distribution: Distribution of Public Keys,
43			X.509 certificates	to understand X.509 Certificate
44			Advanced Topics: Firewall, Intruders, Virus, Trojans, Malware, and Ransomware	to lern about advance topiucs like firewall,intruders, virus, Trojans, malwares and Ransomware

FACULTY OF ENGG. & TECH. - PIET		
PARUL INSTITUTE OF ENGINEERING & TECHNOLOGY		
DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING		
SEMESTER: 7TH		
Name of Teachers: Ramizraja Shethwala Subject: STQA (203105395)		
Sr. No.	Name of Topic	Lecture
UNIT- 1	SOFTWARE TESTING	8 hours
1	Testing, Verification and Validation, Test Strategies for Conventional and Object-Oriented Software	1
2	Unit Testing, Integration Testing	2
3	Validation Testing, Alpha and Beta Testing	3
4	Recovery Testing, System Testing	4
5	Security Testing, Stress Testing	5
6	Performance Testing, Metrics for Source Code	6
7	Metrics for Testing, Debugging Process	7
8	Debugging Strategies	8
UNIT- 2	TESTING TECHNIQUES	8 Hours
9	Software Testing Fundamentals, Black Box and White Box Testing	9
10	Basis Path Testing, Flow Graph Notation	10
11	Independent Program Paths, Graph Matrices	11
12	Control Structure Testing, Condition Testing	12
13		13
14	Graph Based Testing Methods	14
15	Methods, Equivalence Partitioning	15
16	Boundary Value Analysis.	16
UNIT- 3	OBJECT ORIENTED TESTING METHODS	8 Hours
17	Applicability of Conventional Test Case	17
18	Design Methods, Issues in Object Oriented Testing	18
19	Fault-Based Testing, Scenario-Based Testing	19
20	Random Testing	20
21	Partition Testing for Classes	21
22	Inter Class Test Case Design	22
23	Test cases Design	23
24	Test cases Design example	24
UNIT- 4	Testing Process and Specialized Systems Testing	8 Hours
25	Test Plan Development, Requirement Phase	25
26	Design Phase and Program Phase Testing	26
27	Testing Client/Server Systems	27

28	Testing Web based Systems, Testing	28
29	Off the-Shelf Software,	29
30	Testing in Multiplatform Environment,	30
31	Testing for Real Time Systems	31
32	Testing Security	32
UNIT- 5	Software Quality Assurance Concepts and Standards	8 Hours
33	Quality Concepts, Quality Control, Quality Assurance	33
34	SQA Activities, Software Reviews	34
35	Formal Technical Reviews, Review Guidelines	35
36	Software Reliability, Software Safety	36
37	Quality Assurance Standards, ISO9000, ISO9001:2000, I	37
38	SO9126QualityFactors, CMM	38
39	TQM, Six Sigma, SPICE	39
40	Software Quality Assurance Metrics	40
UNIT- 6	Risk Management and Change Management	8 Hours
41	Software Risks, Risk Identification	41
42	Risk Projection, Risk Refinement,	42
43	The RMMM Plan, Software Configuration Management	43
44	Baselines, Software Configuration Items.	44
45	CM Process: Version Control	45
46	Change Control, Configuration	46
47	Audit	47
48	Configuration Management for Web Engineering	48

Link https://onlinecourses.nptel.ac.in/noc23_cs62/preview

ABOUT THE COURSE:

Cyber-physical systems (CPS), which consist of physical systems tightly integrated and/or controlled by software, are ubiquitous in many safety critical domains, including automotive, avionics, railways, healthcare, atomic energy, power, and industrial automation. The principles of design and implementation of cyber-physical systems are remarkably different from that of other embedded systems because of the tight integration of real valued and dense time real time systems with software based discrete automated control. The objective of this course is to develop an exposition of the challenges in implementing a cyber-physical system from a computational perspective, but based equally on the principles of automated control. The course aims to expose the student to real world problems in this domain and provide a walk through the design and validation problems for such systems. With the advent of AI techniques, their increased use in CPS is also a promising growth vertical along with the necessity of safety assurance. In this course we also touch upon concepts of Neural Network based decision making for Continuous Systems while guaranteeing safety and stability using control theoretic constraint solving

INTENDED AUDIENCE: UG/PG students of CSE/EE/ECE

PREREQUISITES:

1. Basic Programming Knowledge
2. Engineering Mathematics

INDUSTRY SUPPORT: "Tier 1 Automotive companies: Robert Bosch Engineering, OEM Automotive companies: TML, BMW, Daimler, Mahindra etc, Govt Labs like DRDO, HAL"

Course layout

Week 1: CPS : Motivational examples and compute platforms **Week 2:**

Real time sensing and communication for CPS **Week 3:** Real time task scheduling for CPS

Week 4: Dynamical system modeling, stability, controller design

Week 5: Delay-aware Design; Platform effect on Stability/Performance

Week 6: Hybrid Automata based modeling of CPS

Week 7: Reachability analysis

Week 8: Lyapunov Stability, Barrier Functions

Week 9: Quadratic Program based safe Controller Design

Week 10: Neural Network (NN) Based controllers in CPS

Week 11: State Estimation using Kalman Filters (KF)

Week 12: Attack Detection and Mitigation in CPS

Books and references

1. "Principles of Cyber-Physical Systems" - Rajeev Alur
 2. "Introduction to Embedded Systems — A Cyber— Physical Systems Approach" - E. A. Lee, Sanjit Seshia
-

Student Chapter / Council Details and Planned Activity

Sr No.	Student Chapter	POC	Contact No.
1.	Coding Club	Kiran Kumar	+91 9000694782
2.	Hacking Club	Mayur Pandya	+91 97279 93640
3.	AWS Academy	Prof. Gaurav Varshney	+918979747750

Co-curricular and extra-curricular events during the semester

Sr No.	Events
1.	NCC

Flagship Events of Concerned Institute, Faculty and University

Sr No.	Events
1.	Tech Expo
2.	PICET
3.	PU Code Hackethone
3.	Projection

- Prominent academic competition (Outside PU)**

Sr No.	Events
1.	SIH(Smart India Hacktheron)

Details of Value-added courses and Professional courses

1. Value Added Course on Web Designing in September 2024

Details of visits planned during semester

1. Online Industrial Visit @ Macroworld, Ahmedabad in August 2024

Details of expert talk during the semester

1. 2 Days Hands-on Workshop on JavaScript in August 2024
2. 2 Days Hands-on Workshop on NodeJS in September 2024

Coordinators of Various Committee (Anti Ragging, WDC, ICC, Office of International Affairs,

Centre of International Relations and Research, PIERC, Scholarship, PUMIS, Mentoring etc.)

Committee	Coordinator	Contact no.	Email Address
Anti Ragging,	Rakesh Mishra	9473122585	rakeshkumar.mishra12731@paruluniversity.ac.in
WDC,	Swati Prajapati	9909012774	swati.prajapati@paruluniversity.ac.in
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Interaction of Various Media Platforms

Platforms	Links
Facebook	<u>https://www.facebook.com/ParulUniversity</u>
Instagram	<u>https://www.instagram.com/paruluniversity/?hl=en</u>
Linkedin	<u>https://in.linkedin.com/school/paruluniversity/</u>
Youtube	<u>https://www.youtube.com/channel/UCeXQgKg0qhTKbNRi5hpIL9A</u>
NPTEL Courses	<u>https://onlinecourses.nptel.ac.in/noc24cs71/preview</u> <u>https://onlinecourses.nptel.ac.in/noc24cs115/preview</u>