PES UNIVERSITY

B. TECH IN COMPUTER SCIENCE AND ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES

- Prepare and train students in theoretical foundations to work with cutting edge computing technologies and design solutions to complex engineering problems, making them ready to work in industrial environment.
- Develop all round skills such as team building, inter-personal skills, and leadership qualities in order to effectively communicate with engineering community and with society at large.
- Promote research culture through internships, research assistantships, research-oriented projects, sponsored and collaborative research and enable them to pursue higher studies in computer science and related fields.
- To inculcate social concern meeting the requirements of prospective employers and to develop an ability to innovate efficient computing solutions for a better society.
- Create professionally superior and ethically strong globally competent employees and entrepreneurs.

PROGRAM OUTCOMES

- Apply mathematical and theoretical principles in the modelling and design of high-quality computer-based systems using state-of-the-art computer technology.
- Conduct in-depth study of research literature in the area of Computer Science, analyse problems in order to arrive at substantiated conclusions using first principles of mathematics, and allied sciences.
- Design, implement and evaluate Computer Systems, programs and processes that meet partial/ complete specifications with concern for society, environment and culture.
- Design and conduct experiments, collect data, analyze and interpret the results to investigate complex engineering problems in the field of Computer Science.
- Apply state-of-the-art techniques and modern computer-based tools in prediction, comparison and modelling of complex engineering activities.
- Have a sound understanding of professional, legal, security and social issues and responsibilities in engineering activities involving Computer Science.
- Understand societal and environmental concerns and demonstrate responsibility in sustainable development of computer-based solutions.
- Be aware of ethical and professional responsibilities in engineering situations; make informed judgments regarding intellectual property and rights in relation to computer-based solutions in global, economic, environmental and societal contexts.
- Able to function effectively in teams to establish goals, plan tasks, meet deadlines, manage risk and produce high-quality technical solutions.
- Contribute and communicate effectively with the society, be able to write effective reports and design documents by adhering to appropriate standards, make effective presentations, give and receive clear instructions.
- Apply skills in clear communication, responsible teamwork and time management by, for example, managing a team or project and communicating with external stakeholders.
- Recognize the need for and demonstrate an ability to engage in continuing professional development in its broadest sense.

B. TECH IN COMPUTER SCIENCE AND ENGINEERING

I SEMESTER (2020-24 BATCH)

SI. No.	Course Code	Course Title	Hours per week				Credits	Tools / Languages	Course Type
			L	T	P	S			
COMMON TO ALL STUDENTS									
1.	UE20CS101	Python for Computational Problem Solving	4	0	0	4	4	Python	FC
2	UE20CS102	Python for Computational Problem Solving Laboratory	0	0	2	1	1	Python	FC

II SEMESTER (2020-24 BATCH)

SI. No.	Course Code	Course Title	Hours per week				Credits	Tools / Languages	Course Type
			L	T	P	S			
COMMON TO ALL STUDENTS									
1.	UE20CS151	Problem Solving with C	4	0	0	4	4	C	FC
2	UE20CS152	Problem Solving with C Laboratory	0	0	2	1	1	C	FC

III SEMESTER (2019-23 BATCH)

Sl. No.	Course Code	Course Title	Hours per week				Credits	Tools / Languages	Course Type
			L	T	P	S	C		
1	UE19CS201	Digital Design and Computer Organization	4	0	0	4	4		CC
2	UE19CS202	Data Structures and its Applications	4	0	0	4	4	C	CC
3	UE19CS203	Statistics for Data Science	4	0	0	4	4	Python	CC
4	UE19CS204	Web Technologies	4	0	0	4	4	MERN Technologies, HTML, CSS, Javascript	CC
5	UE19CS205	Automata Formal Languages and Logic	4	0	0	4	4	JFLAP	CC
6	UE19CS206	Digital Design and Computer Organization Laboratory	0	0	2	1	1	Icarus, Verilog Simulator, GTKWave waveform viewer	CC
7	UE19CS207	Data Structures and its Applications Laboratory	0	0	2	1	1	Hacker earth / C	CC
8	UE19CS208 X	Special Topic I	0 /2	0	0/4	0/8	2		ST
9	UE20MA101D	Diploma Engineering Mathematics –I (Applicable to Lateral Entry Students)	2	0	0	0	2		FC
Total			**20/22**	**0**	**4/8**	**4/8**	**24/26**		
Note : Prerequiste - None									

IV SEMESTER (2019-23 BATCH)

Sl. No.	Course Code	Course Title	Hours per week				Credits	Tools / Languages	Course Type
			L	T	P	S			
1	UE19MA251	Linear Algebra	4	0	0	4	4	SciLab, Python	CC
2	UE19CS251	Design and Analysis of Algorithms	4	0	0	4	4	Gcc Compiler	CC
3	UE19CS252	Microprocessor and Computer Architecture%	4	0	0	4	4		CC
4	UE19CS253	Computer Networks	4	0	0	4	4	Wireshark, python	CC
5	UE19CS254	Operating Systems@	4	0	0	4	4	Pthread, Experimental Academic OS	CC
6	UE19CS255	Computer Networks Laboratory	0	0	2	1	1	Wireshark, Claynet, Cisco packet tracer	CC
7	UE19CS256	Microprocessor and Computer Architecture Laboratory	0	0	2	1	1	ARM Simulator, Ardino microcontroller kit, MIPS pipeline simulator, ParaCache simulator.	CC
8	UE19CS257 X	Special Topic II	0 /2	0	0 /4	0 /8	2		ST
9	UE20MA151D	Diploma Engineering Mathematics –II (Applicable to Lateral Entry Students)	2	0	0	0	2		FC
Total			**20/22**	**0**	**4/8**	**4/8**	**24/26**		
Note : Knowledge is desirable - %UE19CS201, @ UE19CS202									

V SEMESTER (2018-22 BATCH)

Sl. No.	Course Code	Course Title	Hours per week				Credits	Tools / Languages	Course Type
			L	T	P	S			
1	UE18CS301	Computer Networks	4	0	0	4	4	Wireshark, python	CC
2	UE18CS302	Operating Systems(	4	0	0	4	4	Pthread, Experimental Academic OS	CC
3	UE18CS303	Machine Intelligence*	4	0	0	4	4	Tensorflow 1.15, Keras 2.3.1, Python 3.7	CC
4	UE18CS304	Computer Networks Laboratory	0	0	2	1	1	Wireshark, Claynet, Cisco packet tracer	CC
5	UE18CS305	Operating Systems Laboratory	0	0	2	1	1		CC
6	UE18CS31X	Elective I	4	0	0	4	4		EC
7	UE18CS32X	Elective II	4	0	0	4	4		EC
8	UE18CS306X	Special Topic- III	0	0	4	2	2		ST
Total			**20**	**0**	**2/4**	**2/4**	**24**		
Elective – I									
9	UE18CS311	Advanced Algorithms%	4	0	0	4	4	C or C++	EC
10	UE18CS312	Data Analytics&	4	0	0	4	4	R and Python	EC
11	UE18CS313	Internet of Things^	4	0	0	4	4	Arduino IDE	EC
12	UE18CS314	Applied Cryptography	4	0	0	4	4	Seed lab / C	EC
13	UE18CS315	Database Technologies#	4	0	0	4	4	My SQL, Oracle	EC
14	UE18CS316	Computer Graphics and Visualization!!!	4	0	0	4	4	C, C++, Java, Python using OpenGL	EC
Elective – II									
15	UE18CS321	Principles of Programming Languages	4	0	0	4	4	Gcc/g++, ada, python, prolog, haskell, gdb ,pdb,ruby,java	EC
16	UE18CS322	Big Data$	4	0	0	4	4	Hadoop, HDFS Spark, Streaming spark, HIVE, Hbase, MLlib	EC
17	UE18CS323	Graph Theory and Its Applications!	4	0	0	4	4	C	EC

18	UE18CS324	BlockChain[@]	4	0	0	4	4	Claynet / Python	EC
19	UE18CS325	Web Technologies -II[)]	4	0	0	4	4	MEAN Technologies, HTML, CSS, Javascript	EC

Note: Knowledge is Desirable : (- UE18CS202, UE18CS253,*- UE18CS203, UE18MA251,UE18CS252.

Pre-requisite Courses : %- UE18CS251, &- UE18CS203, ^- UE18CS151, #- UE18CS252, !!!- UE18CS202.

Pre-requisite Courses : $- UE18CS202, UE18CS251, !- UE18CS151, UE18CS202, @- UE18CS202,)- UE18CS204.

ELECTIVES TO BE OPTED FOR SPECIALIZATION

Sl. No.	**SPECIALIZATION**	**ELECTIVE – I**	**ELECTIVE – II**
A	System and Core Computing(SCC)	UE18CS311, UE18CS315, UE18CS316.	UE18CS321, UE18CS322, UE18CS323.
B	Machine Intelligence and Data Science(MIDS)	UE18CS312, UE18CS313, UE18CS315	UE18CS322, UE18CS323.
C	Network and Cyber Security(NWCS)	UE18CS313, UE18CS314.	UE18CS324, UE18CS325.

VI SEMESTER (2018-22 BATCH)

SI. No.	Course Code	Course Title	Hours per week				Credits	Tools / Languages	Course Type
			L	T	P	S			
1	UE18CS351	Compiler Design[!]	4	0	0	4	4	Lex and Yaac	CC
2	UE18CS352	Cloud Computing[@@]	4	0	0	4	4	Amazon AWS, Docker, Kubernetes,github, NoSQL, databases, flask	CC
3	UE18CS353	Object Oriented Analysis and Design with Software Engineering	4	0	0	4	4	Github, MS Project, Jupiter, StarUML/ Java	CC
4	UE18CS354	Cloud Computing Laboratory	0	0	2	1	1		CC
5	UE18CS355	Object Oriented Analysis and Design with Software Engineering Laboratory	0	0	2	1	1	Github, MS Project, Jupiter, Start UML/ OO Languages	CC
6	UE18CS33X	Elective III	4	0	0	4	4		EC
7	UE18CS34X	Elective IV	4	0	0	4	4		EC
8	UE18CS391	Capstone Project Phase-1	0	0	4	2	2		PW
		Total	**20**	**0**	**2/4**	**2/4**	**24**		
Elective – III									
9	UE18CS331	Generic Programming[#]	4	0	0	4	4	C, C++, C#	EC
10	UE18CS332	Algorithms for Intelligence Web and Information Retrieval[**]	4	0	0	4	4	Scikit, Tensorflow, Solr, Lucene Search Engines/ Python	EC
11	UE18CS333	Digital Image Processing[**]	4	0	0	4	4	Matlab	EC
12	UE18CS334	Natural Language Processing[##]	4	0	0	4	4	Tensorflow, Spacy , NLTK, SCIKIT Learn/ Python 3.x	EC
13	UE18CS335	Computer Network Security[%%]	4	0	0	4	4	Seed Labs, Wireshark, netwox, Scapy	EC
14	UE18CS336	Wireless Network Communication[%%]	4	0	0	4	4	Claynet, Python	EC
15	UE18CS337	Cyber Forensics	4	0	0	4	4	Open source Forensics Tools	EC

16	UE18CS338	Enterprise and Resource Planning	4	0	0	4	4		EC
Elective – IV									
17	UE18CS341	Design Patterns**	4	0	0	4	4	UML/ Python	EC
18	UE18CS342	Heterogeneous Parallelism!!!	4	0	0	4	4	pthread, OpenMP CUDA, openCL, Chapel, UPC.	EC
19	UE18CS343	Topics in Deep Learning&&&	4	0	0	4	4	Tensorflow 1.15, Keras 2.3.1/ Python 3.7	EC
20	UE18CS344	Advance Computer Networks***	4	0	0	4	4	Claynet, Cisco packet tracer	EC
21	UE18CS345	Bio-inspired Computing**	4	0	0	4	4	Matlab	EC
22	UE18CS346	Social Network Analytics%%%	4	0	0	4	4	Gephi, VNetLogo, NetwotkX, SocNetV	EC
23	UE18CS347	Information Security	4	0	0	4	4	Seed Labs, Scapy, Burp-Suit,N-Map, 'C'	EC
24	UE18CS348	Human Computer Interaction	4	0	0	4	4		EC
Total			**20**	**0**	**2/4**	**2/4**	**24**		

Note: Knowledge is Desirable : !UE18CS202, UE18CS254,@@UE18CS301,UE18CS302.

Pre-requiiste Courses : # UE18CS151, UE18CS202,UE18CS251 **- UE18CS251, ##UE18CS303,%%UE18CS301.

Pre-requiiste Courses : !!!-UE18CS151, UE18CS253, &&&-UE18CS303, ***UE18CS301, , %%%UE18CS202, UE18MA251

ELECTIVES TO BE OPTED FOR SPECIALIZATION

Sl. No.	SPECIALIZATION	ELECTIVE – III	ELECTIVE – IV
D	System and Core Computing(SCC)	UE18CS331, UE18CS332.	UE18CS341, UE18CS342.
E	Machine Intelligence and Data Science(MIDS)	UE18CS332, UE18CS333, UE18CS334, UE18CS335.	UE18CS343, UE18CS345 UE18CS346, UE18CS347.
F	Network and Cyber Security(NWCS)	UE18CS335, UE18CS336, UE18CS337.	UE18CS344, UE18CS347.

SUMMER TERM (2018-22 BATCH)

SI #.	Course Code	Course Title	Hours / week				Credits	Course Type
			L	T	P	S		
1	UE18CSXXX	Capstone Project Phase-2	0	0	12	0	6	PW
Total			**0**	**0**	**12**	**0**	**6**	

VII SEMESTER (2017-21 BATCH)

SI. No.	Course Code	Course Title	Hours per week				Credits	Tools / Languages	Course Type
			L	T	P	S			
COMMON TO ALL STUDENTS									
1.	UE17CS401	Object Oriented Modelling and Design	4	0	0	4	4	StarUML, Java	CC
2	UE17CS402	Software Engineering	4	0	0	4	4	GitHub, MS Project, Jupiter	CC
3	UE17CS43X	Capstone Project Phase – 1	0	0	8	4	4		PW
4	UE16CS41X	Elective V	4	0	0	4	4		EC
5	UE16CS42X	Elective VI	4	0	0	4	4		EC
Total			4	0	8	4	20		
ELECTIVE - V									
6	UE17CS411	Enterprise and Resource planning	4	0	0	4	4		EC
7	UE17CS412	Algorithms for Information Retrieval^^^	4	0	0	4	4	NLP and ML Libraries / Python 3.x	EC
8	UE17CS413	Wireless Network Communication%%%	4	0	0	4	4	Claynet / Python	EC
9	UE17CS414	BlockChain Technologies $$$	4	0	0	4	4	Claynet / Python	EC
ELECTIVE - VI									
10	UE17CS421	Information Security###	4	0	0	4	4	Seed Labs, Scapy, Burp-Suit,N-Map, 'C'	EC
11	UE17CS422	Social Network Analytics@@@	4	0	0	4	4	Gephi, VNetLogo, NetwotkX, SocNetV	EC
12	UE17CS423	Computer Systems Performance Analysis!!!	4	0	0	4	4	Python, java	EC
13	UE17CS424	Human Computer Interaction	4	0	0	4	4		EC

Note: Pre-requisite Courses --^^^ - UE17CS303, %%%-UE17CS301, $$$-UE17CS202. ###UE17CS331, @@@UE17CS202, UE17MA251,!!! UE17CS253, UE17CS302.

ELECTIVES TO BE OPTED FOR SPECIALIZATION

Sl. No.	SPECIALIZATION	ELECTIVE – V	ELECTIVE – VI
A.	Algorithms & Computing Models	UE17CS411, UE17CS412.	UE17CS422, UE17CS424.
B.	Systems & Core Computing	UE17CS413, UE17CS414.	UE17CS421, UE17CS423.

C.	Data Science	UE17CS411, UE17CS412.	UE17CS421,UE17CS422.

VIII SEMESTER (2017-21 BATCH)

SI #.	Course Code	Course Title	Hours / week				Credits	Tools / Languages	Course Type
			L	T	P	S			
COMMON FOR ALL STUDENTS									
1	UE17CS490	Capstone Project Phase – 2	0	0	8	0	4		PW
	UE17CS45X	Internship/Special Topic/Swamyam/MOOC/ Study Abroad	0	0	16	0	8		PW
Total			**2**	**0**	**20**	**0**	**12**		
SPECIAL TOPIC									
3	UE17CS451	Software Testing	2	0	0	2	2	JUnit, JMeter, Selenium	ST
4	UE17CS452	Research Methodology	2	0	0	2	2	Software for detection of Plagarism ,Mendeley, LaTeX/ MS Office	ST

NOTE : 3 weeks of Internship = 1 credit (Student has to submit regular report+ certificate from Company/Institution wher internship was pursued & evaluated in department).