

(Deemed to be University Estd. u/s 3 of the UGC Act, 1956) PALLAVARAM - CHENNAI ACCREDITED BY NAAC WITH 'A' GRADE Marching Beyond 30 Years Successfully

# B. Tech -

# **Computer Science and Engineering**

# Specialization with AI & ML

**Curriculum and Syllabus** 

**Regulation 2021** 

(Based on Choice Based Credit System (CBCS)

and

**Outcome Based Education (OBE))** 

**Effective from the Academic** 

year 2021-2022

**Department Of** 

**Computer Science and Engineering** 

# **School of Engineering**

# VISION AND MISSION OF THE DEPARTMENT

### VISION

To develop a knowledge hub for Computer Science Engineers and Technocrats in application of their competence for the betterment of the Individual, Industry and Society.

# MISSION

- To nurture the students to be industry ready by providing a strong conceptual foundation and by enhancing their employability and entrepreneurial skills.
- > To provide holistic growth by conducting relevant enrichment programs, which includes curricular, co-curricular, extra-curricular and extension activities.
- > To inculcate innovation and creativity through practically viable Internships and Project works.
- > To create a research oriented mindset and focus in fulfilling growing demands of the society through mentoring and lifelong learning.

# PROGRAM EDUCATIONAL OBJECTIVES (PEO)

- PEO1: Graduates will be engineering practitioners and leaders who will contribute to the solution of industry's technological problems.
- PEO2: Graduates will be engineering professionals, innovators, or entrepreneurs working in industry on technology development, deployment, or engineering system implementation.
- PEO3: Graduates will perform their jobs with social awareness and responsibility.

PEO4: Graduates will interact with their peers in other disciplines in industry and society, contributing to the country's economic growth.

#### **PROGRAM OUTCOMES (PO)**

- **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, research literature, and analyze complex engineering problems reaching substantiated conclusions using 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 the public health and safety, and the 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 modeling 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 the 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 team work:** 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.

#### **PROGRAMME SPECIFIC OUTCOME (PSO)**

- **PSO 1:** Apply a set of Artificial Intelligence principles, tools, and techniques to model various realworld business problems, analyse them, and suggest a suitable solution using appropriate Machine Learning techniques.
- **PSO 2:** Apply Artificial Intelligence and Machine Learning skills in Health Care, Education, Agriculture, e-commerce, the financial sector, Smart Systems, and AI Multi-disciplinary areas.

#### **Competencies and Performance Indicators**

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

1.1	Demonstrate competence in mathematical modelling	1.1.1	Apply the knowledge of discrete structures, linear algebra, statistics and numerical techniques to solve problems
		1.1.2	Apply the concepts of probability, statistics and queuing theory in modeling of computer-based system, data and network protocols.
1.2	Demonstrate competence in basic sciences	1.2.1	Apply laws of natural science to an engineering problem
1.3	Demonstrate competence in engineering fundamentals	1.3.1	Apply engineering fundamentals
1.4	Demonstrate competence in specialized engineering knowledge to the program	1.4.1	Apply theory and principles of computer science and engineering to solve an engineering problem

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

2.1	Demonstrate an ability	2.1.1	Evaluate problem statements and identifies objectives		
	to identify and formulate	2.1.2	Identify processes/modules/algorithms of a computer-based		
	complex engineering		system and		
	problem		parameters to solve a problem		
		2.1.3	Identify mathematical algorithmic knowledge that applies to a		
			given problem		
2.2	Demonstrate an ability to	2.2.1	Reframe the computer-based system into interconnected		
	formulate a solution plan		subsystems		
	and methodology for an	2.2.2	Identify functionalities and computing resources.		
	engineering problem	2.2.3	Identify existing solution/methods to solve the problem,		
			including forming justified		
			approximations and assumptions		
		2.2.4	Compare and contrast alternative solution/methods to select		
			the best methods		
		2.2.5	Compare and contrast alternative solution processes to select		
			the best process.		
2.3	Demonstrate an ability to	2.3.1	Able to apply computer engineering principles to formulate		
	formulate and interpret a model		modules of a system with required applicability and		
			performance.		
		2.3.2	Identify design constraints for required performance criteria.		
2.4	Demonstrate an ability to	2.4.1	Applies engineering mathematics to implement the solution.		
	execute a solution process	2.4.2	Analyze and interpret the results using contemporary tools.		
	and analyze results	2.4.3	Identify the limitations of the solution and sources/causes.		
		2.4.1	Arrive at conclusions with respect to the objectives.		
PO 3:	Design/Development of Solution	ons: Desig	n solutions for complex engineering problems and design system		
	components or processes that most the specified people with appropriate consideration for public health and				

components or processes that meet the specified needs with appropriate consideration for public health and safety, and cultural, societal, and environmental considerations.

3.1	Demonstrate an ability	3.5.1	Able to define a precise problem statement with objectives
	to define a complex/		and scope

	open-ended problem in	3.1.2	Able to identify and document system requirements from
	engineering terms		stake- holders
		3.1.3	Able to review state-of-the-art literature to synthesize system
			requirements.
		3.1.4	Able to choose appropriate quality attributes as defined by
			ISO/IEC/IEEE standard
		3.1.5	Explore and synthesize system requirements from larger social
			and professional
		3.1.6	Able to develop software requirement specifications (SRS).
3.2	Demonstrate an ability to	3.2.1	Able to explore design alternatives.
	generate a diverse set of	3.2.2	Able to produce a variety of potential design solutions suited
	alternative design solutions		to meet functional requirements.
		3.2.3	Identify suitable non-functional requirements for evaluation of
			alternate design solutions.
3.3	Demonstrate an ability	3.3.1	Able to perform systematic evaluation of the degree to which
	to select optimal design		several design concepts meet the criteria.
	scheme for further	3.3.2	Consult with domain experts and stakeholders to select
	development		candidate engineering
3.4	Demonstrate an ability to	3.4.1	Able to refine architecture design into a detailed design within
	advance an engineering		the existing constraints.
	design to defined end	3.4.2	Able to implement and integrate the modules.
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PO 4	state : Conduct investigations of con	3.4.3 nplex pr	Able to verify the functionalities and validate the design. oblems: Use research-based knowledge and research methods
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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.

5.1	Demonstrate an ability to identify/create modern engineering tools,	5.1.1	Identify modern engineering tools, techniques and resources for engineering activities
	techniques and resources	5.1.2	Create/adapt/modify/extend tools and techniques to solve engineering problems
5.2	Demonstrate an ability to select and apply discipline specific tools, techniques and resources	5.2.1	Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs.
ГЭ	Demonstrate an ability to	5.2.2	Demonstrate proficiency in using discipline-specific tools
5.5	evaluate the suitability and	5.5.1	resources
	limitations of tools used to	5.3.2	Verify the credibility of results from tool use with reference to
	solve an engineering		the accuracy and limitations, and the assumptions inherent in
	problem		their use.
PO 6:	The engineer and society: Appl	ly reasor	ing informed by the contextual knowledge to assess societal,
health	n, safety, legal, and cultural iss	ues and	the consequent responsibilities relevant to the professional
engin	eering practice.	C 1 1	tele stift, and elegentic construction and the sector state of the
6.1	Demonstrate an ability	6.1.1	identify and describe various engineering roles; particularly as
	roles in a broader context.		global, regional and local level
	e.g. pertaining to the		
	environment, health, safety,		
	legal and public welfare		
6.2	Demonstrate an	6.2.1	Interpret legislation, regulations, codes, and standards
•	understanding of		relevant to your discipline and explain its contribution to the
	professional engineering		protection of the public
	regulations, legislation and		
	standards		
PO 7:	Environment and sustainability	: Unders	tand the impact of the professional engineering solutions in
societ	, al and environmental contexts,	and den	nonstrate the knowledge of, and the need for sustainable
devel	opment.		
7.1	Demonstrate an	7.1.1	Identify risks/impacts in the life-cycle of an engineering
	understanding of the		product or activity
	impact of engineering and	7.1.2	Understand the relationship between the technical, socio-
	industrial practices on		economic and environmental dimensions of sustainability
	in economic contexts		
7.2	Demonstrate an ability to apply	7.2.1	Describe management techniques for sustainable development
	principles of sustainable design		
	and development	7 2 2	Apply principles of proventive engineering and exetting his
		1.2.2	Apply principles of preventive engineering and sustainable
			development to an engineering activity or product relevant to
			the discipline

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

8.1	Demonstrate an ability to recognize ethical dilemmas	8.1.1	Identify situations of unethical professional conduct and propose ethical alternatives		
8.2	8.2 Demonstrate an ability to		Identify tenets of the ASME professional code of ethics		
	apply the Code of Ethics	8.2.2	Examine and apply moral & ethical principles to known case		
			studies		

PO 9:	PO 9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse				
teams	, and in multidisciplinary	settings	s.		
9.1	Demonstrate an ability t form a team and define role for each member	o a	9.1.1	1	Recognize a variety of working and learning preferences; appreciate the value of diversity on a team
			9.1.2	2	Implement the norms of practice (e.g. rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
9.2	Demonstrate effective individual and team operations		9.2.1	1	Demonstrate effective communication, problem-solving, conflict resolution and leadership skills
	communication,		9.2.2	2	Treat other team members respectfully
	problem solving,		9.2.3	3	Listen to other members
	conflict resolution and leadership skills		9.2.4	4	Maintain composure in difficult situations
<mark>9.6</mark>	Demonstrate success in a team-based project		9.6.1	1	Present results as a team, with smooth integration of contributions from all individual efforts
PO 10	: Communication: Communication: Communication:	nunicat tv at lar	e efi	fect	tively on complex engineering activities with the engineering
design	documentation, make e	ffective	pres	sent	tations, and give and receive clear instructions
10.1	Demonstrate an ability to comprehend		10.1	1	Read, understand and interpret technical and non-technical information
	technical literature and document project work		10.1.2		Produce clear, well-constructed, and well-supported written engineering documents
			10.1	.3	Create flow in a document or presentation - a logical progression of ideas so that the main point is clear
10.2	Demonstrate competen in listening, speaking, ar	ce nd	10.2	.1	Listen to and comprehend information, instructions, and viewpoints of others
	presentation		10.2	.2	Deliver effective oral presentations to technical and non- technical audiences
10.3	Demonstrate the ability integrate different mode	to es of	10.3	.1	Create engineering-standard figures, reports and drawings to complement writing and presentations
	communication 1		10.3	.2	Use a variety of media effectively to convey a message in a document or a Presentation
PO 11: manag and in	Project management and ement principles and app multidisciplinary environ	d finance bly these ments.	e: De e to c	emo	onstrate knowledge and understanding of the engineering and 's work, as a member and leader in a team, to manage projects
	Demonstrate an ability to evaluate the	11.1.1		Des eng	scribe various economic and financial costs/benefits of an gineering activity
11.1 economic and financial performance of an engineering activity		11.1.2	1	Ana fina	alyze different forms of financial statements to evaluate the ancial status of an engineering project

	Demonstrate an ability		
	to compare and		Analyze and select the most appropriate proposal based on economic
11.2	contrast the	11.2.1	and financial considerations.
	costs/benefits of		
	alternate proposals		
	for		
	an		
	engineering activity		
	Demonstrate an	11 2 1	Identify the tasks required to complete an engineering activity, and
	ability to	11.3.1	the resources required to complete the tasks.
11.3	plan/manage an		Use preject management tools to schedule an engineering preject, so
	engineering	11.3.2	it is completed on time and on budget
	activity within time and		it is completed on time and on budget.
	budget constraints		
PO 12:	Life-long learning: Recog	nise the ne	ed for, and have the preparation and ability to engage in
indepe	ndent and life-long learn	ing in the b	roadest context of technological change.
	Demonstrate an ability	12.1.1	Describe the rationale for the requirement for continuing
12.1	to identify gaps in		professional development
	knowledge and a	1212	Identify deficiencies or gaps in knowledge and demonstrate an ability
	strategy to close		to source information to close this gap
	these gaps		
	Demonstrate an	12.2.1	Identify historic points of technological advance in engineering that
	ability to identify		required practitioners to seek education in order to stay current
12.2	changing trends in		Recognize the need and be able to clearly explain why it is vitally
	engineering	12.2.2	important to keep current regarding new developments in your field
	knowledge and		
	practice		
12.3	Demonstrate an ability	12.3.1	Source and comprehend technical literature and other credible
	to identify and access		
	sources for new		Analyze sourced technical and popular information for feasibility,
	information	12.3.2	viability, sustainability, etc.

PSO 1: Apply a set of Artificial Intelligence principles, tools, and techniques to model various real-world business problems, analyse them, and suggest a suitable solution using appropriate Machine Learning

13.1	Ability to investigate complex problems	13.1.1	Identify problem statements and develop smart solutions for real time applications
		13.1.2	Investigate all the probable solutions towards the identified problem
13.2	Design and Develop solutions systematically	13.2.1	Specify the design tools that may help in finding the solution
		13.2.2	Systematically evaluate and identify the testing strategies to develop an optimal solution
		13.2.3	Implement an optimal solution for the desired problem

PSO 2: Apply Artificial Intelligence and Machine Learning skills in Health Care, Education, Agriculture, e- commerce, the financial sector, Smart Systems, and AI Multi-disciplinary areas.

	Develop cost benefit solutions using engineering	14.1.1	Describe the rationale for choosing solutions based on engineering. principles	
14.1	principles and practices	14.1.2	Conduct feasibility and cost-benefit analysis for implementing the solution	
14.2	Ability to understand and develop the social and	14.2.1	Identify the problem and develop an appropriate solution	
	the current technology	14.2.2	Design solution with ethics for social and environmental problems	

### VELS INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS) SCHOOL OF ENGINEERING

### DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

#### The Panel members for Board of studies meeting are listed below

S. No	Name of the Board Member	Designation	Institute / Industry
Interna	l Members		
1	Dr. R. Anandan	Professor & Head Department of Computer Science and	Chairman
		Vels Institute of Science, Technology & Advanced Studies (VISTAS)	
2	Dr. S. Arun	Director, IQAC Vels Institute of Science, Technology & Advanced Studies (VISTAS)	Internal Member
3	Dr. R. A. Karthika	Associate Professor Department of Computer Science and Engineering Vels Institute of Science, Technology & Advanced Studies (VISTAS)	Internal Member
4	Dr. A. Rajesh	Associate Professor Department of Computer Science and Engineering Vels Institute of Science, Technology & Advanced Studies (VISTAS)	Internal Member
5	Dr. K. Kalaivani	Assistant Professor Department of Computer Science and Engineering Vels Institute of Science, Technology & Advanced Studies (VISTAS)	Internal Member
Externa	l Expert Members		
1	Dr. Asnath Victy Phamila Y	Associate Professor School of Computer Science and Engineering Vellore Institute of Technology - VIT Chennai	Academic Expert
2	Mr. Santhosh Gopynadhan	Senior Director Optum Global Solutions (India) Private	Industrial Expert
Ch. J.	• • • • • • • • • • • • • • • • • • •		
Student	t Member	Drojast Associata	Alumni
1	Mr. Pavan Srivatsav	Cognizant Technology Solutions, Chennai	Alumni

# VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED

#### STUDIES SCHOOL OF ENGINEERING

#### DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

	B. Tech -Computer Science and Engineering Specialization with AI & ML									
	Credits Per Semester									
S.No	Course Category	1	2	3	4	5	6	7	8	Total Credits
1	HSC	-	3	2	2	2	2	-	-	11
2	BSC	10	10	4	7	-	-	-	-	31
3	ESC	8	8	3	-	-	-	-	-	19
4	РСС	-	-	13	15	13	9	4	-	56
5	PEC	-	-	-	-	3	7	7	3	20
6	OEC	-	-	-	-	3	3	6	6	18
7	Project	-	-	-	-	-	-	5	10	15
8	MC	-	-	2	-	-	-	-	-	2
	TOTAL	18	21	24	24	21	21	22	19	170

#### **CREDIT DISTRIBUTION**

HSC	Humanities and Social Science Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
PCC	Professional Core Courses
PEC	Professional Elective Courses
OEC	Open Elective Courses
EEC	Employability Enhancement Courses
MC	Mandatory Courses

# VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES (VISTAS)

		B.Tech CSE Regulation	AI & ML 2021-22)					
Category	Course Title	Lecture	Tutorial	Practical	Credit s	CA	SEE	Total
		SEMES	STER 1					
BSC	Chemistry	3	1	-	4	40	60	100
BSC	Mathematics – I (Calculus & Linear Algebra)	3	1	-	4	40	60	100
ESC	Programming for Problem Solving	3	-	-	3	40	60	100
BSC	Chemistry Laboratory	-	-	4	2	40	60	100
ESC	Programming for Problem Solving Laboratory	-	-	4	2	40	60	100
ESC	Workshop / Manufacturing Practices	1	-	4	3	40	60	100
		10	2	12	18			
	English	SEIVIES		_	2	40	60	100
	Physics (Somiconductor Physics)	2	1		2	40	60	100
BSC	Mathematics II (Probability and Statistics)	3	1	-	4	40	60	100
ESC	Basic Electrical Engineering	3	1	-	4	40	60	100
ESC	Engineering Graphics and Design	1	-	4	3	40	60	100
HSC	English Laboratory	-	-	2	1	40	60	100
BSC	Physics Laboratory (Semiconductor Physics)	-	-	4	2	40	60	100
ESC	Electrical Engineering Laboratory	-	-	2	1	40	60	100
		12	3	12	21			
		CENAEC						
BSC	Mathematics III (Fourier Series and Transforms)	3	1	-	4	40	60	100
FSC	Digital Electronics	3	-	-	3	40	60	100
PCC	Operating Systems	3	-	-	3	40	60	100
PCC	Data Structures and Algorithms	3	1	-	4	40	60	100
PCC	Foundations of AI and ML	3	-	2	4	40	60	100
PCC	Operating Systems Lab		_	2	1	40	60	100
РСС	Data Structures and Algorithms Lab	-	-	2	1	40	60	100
HSC	Personality Development I (Effective Technical Communication)	2	_	-	2	40	60	100
мс	Basic Life Skills	2	-	-	2			100
		19	2	6	24			

		SEMES	STER IV					
BSC/PCC	Mathematics IV	3	1	-	4	40	60	100
	(Random Process & Queuing Theory)	3	-	-	3	40	60	100
PCC/ESC	Architecture							
PCC	Database Management Systems	3	-	-	3	40	60	100
PCC	Computer Networks	3	-	-	3	40	60	100
PCC	Programming for AI and ML	3	-	2	4	40	60	100
PCC	Database Management Systems Lab	-	-	2	1	40	60	100
PCC	Computer Networks Lab	-	-	2	1	40	60	100
HSC	Personality Development II	2	-	-	2	40	60	100
BSC	Environmental Science and Engineering	3	-	-	3	40	60	100
МС	Constitution of India	2	-	-	-			100
		22	1	6	24			
	S	SEMESTER	v					
PCC	Java and Web Programming	3	-	-	3	40	60	100
PCC	Mobile Application Development	3	-	-	3	40	60	100
PEC	Professional Elective Course - I	3	-	-	3	40	60	100
OEC	Open Elective Course - I	3	-	-	3	40	60	100
PCC	Deep Learning and Predictive modelling	3	-	2	4	40	60	100
PCC	Java and Web Programming Lab	-	-	2	1	40	60	100
PCC	Mobile Application Development Lab	-	-	2	1	40	60	100
HSC	Personality Development III	2	-	-	2	40	60	100
РСС	Industrial Training/ Mini Project/ MOOC Course (NPTEL/SWAYAM/Course Era/Math works) - Minimum 4 weeks	-	-	2	1			100
		17	0	8	21			
		CENNECTED	) \/I					
PCC	Net Programming	3	-	_	3	40	60	100
PCC	Cognitive Learning	3	_	_	3	40	60	100
PEC	Professional Elective Course – II	3	-	_	3	40	60	100
PEC	Professional Elective Course – III	3	-	2	4	40	60	100
OEC	Open Elective Course – II							400
		3	-	-	3	40	60	100
PCC	.Net Programming Lab	-	-	2	1	40	60	100
PCC	Cognitive Learning Lab	-	-	2	1	40	60	100
HSC	Personality Development - IV	2	-	-	2	40	60	100
PCC	Summer Internship (4 weeks)	-	-	2	1			100
		17	0	8	21			

		SEMESTER	R VII						
PCC	Full Stack Web Development	3	-	-	3	40	60	100	
OEC	Open Elective Course – III	3	-	-	3	40	60	100	
OEC	Open Elective Course – IV	3	-	-	3	40	60	100	
PEC	Professional Elective Course - IV	3	-	-	3	40	60	100	
PEC	Professional Elective Course - V	3	-	2	4	40	60	100	
PCC	Full Stack Web Development Lab	-	-	2	1	40	60	100	
Project	Project Phase I	-	-	10	5	40	60	100	
		15	0	14	22				
		SEMESTE	R VIII						
PEC	Professional Elective Course - VI	3	-	-	3	40	60	100	
OEC	Open Elective Course - V	3	-	-	3	40	60	100	
OEC	Open Elective Course - VI	3	-	-	3	40	60	100	
Project	Project Phase II	-	-	20	10	40	60	100	
		9	0	20	19				

# LIST OF ALL BASIC SCIENCE COURSES (BSC)

		Hours / Week			Credits
S.NO	COURSE TITLE	Lecture	Tutorial	Practical	
BSC - 01	Physics	3	1	-	4
BSC - 02	Mathematics I (Calculus and Linear Algebra)	3	1	-	4
BSC - 03	Physics Laboratory (Semiconductor Physics)	-	-	4	2
BSC - 04	Chemistry	3	1	-	4
BSC - 05	Mathematics II (Probability and Statistics)	3	1	-	4
BSC - 06	Chemistry Laboratory	-	-	4	2
BSC - 07	Mathematics III (Fourier Series and Transforms)	3	1	-	4
BSC - 08	Environmental Science and Engineering	3	-	-	3
BSC - 09	Mathematics IV (Random Process and Queuing Theory)	3	1	-	4

#### LIST OF ALL HUMANITIES AND SOCIAL SCIENCES COURSES

			ek	Credits	
S.NO	COURSE TITLE	Lecture	Tutorial	Practical	
HSC - 01	English	2	-	-	2
HSC - 02	English Laboratory	-	-	2	1
HSC - 03	Personality Development I (Effective	2	-	-	2
	Technical Communication)				
HSC- 04	Personality Development II	2	-	-	2
HSC - 05	Personality Development III	2	-	-	2
HSC - 06	Personality Development IV	2	-	-	2

#### LIST OF ALL ENGINEERING SCIENCE COURSES

		Hours / Week			Credits
S.NO	COURSE TITLE	Lecture	Tutorial	Practical	
ESC-01	Basic Electrical Engineering	3	1	-	4
ESC-02	Engineering Graphics and Design	1	-	4	3
ESC-03	Electrical Engineering Laboratory	-	-	2	1
ESC-04	Programming for Problem Solving	3	-	-	3
ESC-05	Workshop and Manufacturing Practices	1	-	4	3
ESC-06	Programming for Problem Solving Laboratory	-	-	4	2

#### LIST OF ALL PROFESSIONAL ELECTIVE COURSES

S.N O	COURSE TITLE		Hours / Week			
I	PROFESSIONAL ELECTIVE	Lecture	Tutorial	Practical	-	
PEC-01	Applied Cryptography	3	-	-	3	
PEC-02	Big-Data Programming	3	-	-	3	
PEC-03	Cloud Computing	3	-	-	3	
PEC-04	Cryptography and Network Security	3	-	-	3	
PEC-05	Cyber Forensics	3	-	-	3	
PEC-06	Data Warehousing and Data Mining	3	-	-	3	
PEC-07	Digital Image Processing	3	-	-	3	
PEC-08	E- Commerce	3	-	-	3	
PEC-09	Ethical Hacking	3	-	-	3	
PEC-10	Information Retrieval	3	-	-	3	
PEC-11	Object Oriented Analysis and Design	3	-	-	3	
PEC-12	Soft Computing	3	-	-	3	
PEC-13	Software Engineering	3	-	-	3	
PEC-14	Software Project Management	3	-	-	3	
PEC-15	Software Quality Assurance	3	-	-	3	
PEC-16	Software Testing	3	-	-	3	
PEC-17	System Software	3	-	-	3	
PEC-18	User Interface Design	3	-	-	3	
PEC-19	Virtual Reality	3	-	-	3	
PEC-20	Agile Methodologies	3	-	-	3	
PEC-21	Information Security	3	-	-	3	
PEC-22	Software Defined Networks	3	-	-	3	
PEC-23	Block Chain Technologies	3	-	-	3	
PEC-24	Natural Language Processing	3	-	-	3	
PEC-25	Applications of AI	3	-	-	3	
PEC-26	Artificial Intelligence for Cyber Security	3	-	-	3	
PEC-27	Artificial Intelligence in Block chain	3	-	-	3	

		ŀ	k	Credits	
S.NO	Course Title	Lecture	Tutorial	Practical	
PEC – 28	Data Exploration and Visualization	3	-	2	4
PEC - 29	Big Data Analytics	3	-	2	4
PEC - 30	Python for Data Science	3	-	2	4
PEC - 31	Nosql Database	3	-	2	4
PEC - 32	Game Programming	3	-	2	4
PEC - 33	Robotics And Its Applications	3	-	2	4
PEC - 34	Concepts Of Virtual Reality and	3	-	2	4
	Augmented Reality				
PEC - 35	Embedded Systems for Internet Of Things	3	-	2	4

### LIST OF ALL MANDATORY COURSES

	Course Title	Lecture	Tutorial	Practical	Credit s
S. NO					
MC - 01	Constitution of India	2	-	-	-
MC - 02	Basic Life skills	2	-	-	-

			Credits		
S. No	COURSE TITLE	Lecture	Tutorial	Practical	-
OEC - 01	Data Structures And Algorithms	3	-	-	3
OEC - 02	Internet Of Things	3	-	-	3
OEC - 03	Python Programming	3	-	-	3
OEC - 04	Artificial Intelligence	3	-	-	3
OEC - 05	Cloud Computing	3	-	-	3
OEC - 06	E-Commerce	3	-	-	3
OEC - 07	Ethical Hacking	3	-	-	3
OEC - 08	Introduction To Data Analytics	3	-	-	3
OEC - 09	Fundamentals Of AI And ML	3	-	-	3

#### LIST OF ALL OPEN ELECTIVE COURSES OFFERED FOR OTHER DEPARTMENT