

Course Curriculum

2022 & 2023 Batch

B.Tech IT (2022 Batch)

B.Tech ECE (2022 Batch)

B.Tech IT-Bin (2022 Batch)

&

B.Tech IT (2023 Batch)

B.Tech ECE (2023 Batch)

B.Tech IT-Bin (2023 Batch)

Indian Institute of Information Technology, Allahabad
Department of Information Technology
B.Tech. IT curriculum
(2022 Batch)

Total Credit : 164

Semester 1 Total Credit: 20					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Physics	PHY	Core	4	2-1-1
2	Linear Algebra	LAL	Core	4	3-1-0
3	Introduction to Programming	ITP	Core	4	2-1-1
4	Fundamentals of Electrical & Electronics Engg.	FEE	Core	4	2-1-1
5	Professional Communication	PFC	Core	2	1-0-1
6	Principles of Management	POM	Core	2	1-1-0
Total					11-10-08
				20	29

Semester 2 Total Credit: 22					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Discrete Mathematical Structures	DMS	Core	4	3-1-0
2	Univariate and Multivariate Calculus	UMC	Core	4	3-1-0
3	Computer Organization and Architecture	COA	Core	4	2-1-1
5	Data Structures	DST	Core	4	2-1-1
6	Principles of Communication Engineering	PCE	Core	4	2-1-1
7	Principle of Economics	POE	Core	2	2-0-0
Total					14-10-06
				22	30

Semester 3 Total Credit: 20					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Probability and Statistics	PAS	Hard	4	3-1-0
2	Theory of Computation	TOC	Hard	4	2-1-1
3	Object Oriented Methodologies	OOM	Hard	4	2-1-1
4	Operating System	OPS	Hard	4	2-1-1
5	Introduction to Finance	IOF	Hard	2	2-0-0
6	Introduction to Marketing	IOM	Hard	2	1-0-1
Total					12-08-08
				20	28

B.Tech. IT 2022 Batch (Proposed Curriculum)

Semester 4 Total Credit: 21					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Design and Analysis of Algorithms	PC-IT-DAA-404	PCC	4	3-0-2-0
2	Principles of Programming Language	PC-IT-PPL-403	PCC	3	3-0-0-0
3	Computer Networks	PC-IT-CNE-404	PCC	4	3-0-2-0
4	Software Engineering	PC-IT-SOE-303	PCC	3	2-0-2-0
5	Database Management System	PC-IT-DBM-404	PCC	4	3-0-2-0
6	Multi-Disciplinary Minor-1		MDM	3	3-0-0-0
Total					17-00-08-00
				21	25

Semester 5 Total Credit: 25					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Cyber Security	PC-IT-CSE301	PCC	4	3-0-2-0
2	Introduction to Machine Learning	PC-IT-IML302	PCC/VSEC	4	3-0-2-0
3	Image and Video Processing	PC-IT-IVP303	PCC/VSEC	4	3-0-2-0
4	Artificial Intelligence	PC-IT-AIN304	PCC	3	2-0-2-0
5	Project-I (Research Methodology)	PC-IT-PRO351	ELC	2	0-0-4-0
6	Computer Graphics and Visualization	PC-IT-CGV208	PCC	3	2-0-2-0
7	Design Thinking and Innovation	HM-MS-DTI306	HSMC	2	1-0-2-0
8	Multi-Disciplinary Minor-2		MDM	3	3-0-0-0
Total				25	17-0-16-0
					33

Semester 6 Total Credit: 20					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Data Analytics	PC-IT-DAN305	PCC	3	2-0-2-0
2	Project-II	PC-IT-PRJ352	ELC	4	0-0-8-0
3	Biology for Engineers	BS-AS-BFE301	BSC	2	2-0-0-0
4	Elective-1	PE-IT-XXX401	PEC	3	3-0-0-0
5	Elective-2	PE-IT-XXX402	PEC	3	3-0-0-0
6	Indian/Foreign language Regional Language, Sanskrit, German, Japanese, French	HM-xx-XXX304	HSMC (AEC)	2	1-0-2-0
7	Multi-Disciplinary Minor-3		MDM	3	3-0-0-0
Total				20	14-0-12-0
					26

Exit: After successful completion of 6 semesters, a student may get an exit option as per ordinance after completion of the summer semester internship (3 credits) and additional 3 credit courses in summer.

Summer Semester Total Credit: 3					
Sl. No.	Course Name	Code	Type	Credit	
1	Internship	PC-IT-ITP353	ELC	3	Credit will be added in VII Sem.

Note: Internship will be evaluated in the beginning of seventh semester. Its credit and grades will be reflected in the 7th Semester Grade Sheet.

Semester 7 Total Credit: 21					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Minor Project	PC-IT-PRJ451	ELC	4	0-0-8-0
2	Elective-3	PE-IT-XXX403	PEC	3	3-0-0-0
3	Elective-4	PE-IT-XXX404	PEC	3	3-0-0-0
4	Open Elective-1	OE-ZZ-XXX4SS	OEC	3	3-0-0-0
5	History of Indian Civilizations / Kautilya's Arthashastra / Vedic Mathematics / Vedic Corpus/Wisdom from the Ages/Panini's Grammar	HM-MS-XXX408	HSMC (IKS)	2	2-0-0-0
6	Internship (Summer Semester)	PC-IT-TO353	ELC	3	0-0-0-6
7	Multi-Disciplinary Minor-4		MDM	3	3-0-0-0
Total				21	14-0-8-6
					28

Semester 8 Total Credit: 15					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Major Project	PC-IT-PRJ452	ELC	6	0-0-12-0 0-0-0-6
2	Elective-5	PE-IT-XXX402	PEC	3	3-0-0-0 0-0-0-3*
3	Open Elective-2	OE-ZZ-XXX4SS	OEC	3	3-0-0-0 0-0-0-3*
4	Multi-Disciplinary Minor-5		MDM	3	3-0-0-0
Total				15	9-0-12-0
					21

*8th Semester courses may be allowed to join via MOOC/NPTEL etc.

MMDM Baskets (for students admitted in July 2022):

Minor-I: Entrepreneurship & Innovation [1-Fundamentals of Entrepreneurship, 2-Social Entrepreneurship, 3-Entrepreneurial Finance, 4-Innovation Management, 5-Managing Corporate Entrepreneurship]

Minor-II: Economics & Finance for Engineers [1-Indian Economics, 2-Money and Banking, 3-Economics of Business Environment, 4-Start-up Economics, 5-Digital Economics]

Minor-III: Science of Happiness [1-Introduction to Science of Happiness, 2-Understanding Domains of Happiness, 3-Happiness Indices, 4-Assessment of happiness, 5-Independent Study of Science of Happiness]

Indian Institute of Information Technology, Allahabad
Department of Information Technology
B.Tech. ECE curriculum
(2022 Batch)

Total Credit : 161

Semester 1 Total Credit: 20					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Physics	PHY	Core	4	2-1-1
2	Linear Algebra	LAL	Core	4	3-1-0
3	Introduction to Programming	ITP	Core	4	2-1-1
4	Fundamentals of Electrical & Electronics Engg.	FEE	Core	4	2-1-1
5	Professional Communication	PFC	Core	2	1-0-1
6	Principles of Management	POM	Core	2	1-1-0
					11-10-08
Total				20	29

Semester 2 Total Credit: 22					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Univariate and Multivariate Calculus	UMC	Core	4	3-1-0
2	Digital System Design	DSD	Core	4	3-1-0
3	Data Structures	DST	Core	4	2-1-1
5	Electronic Devices and Circuits	EDC	Core	4	2-1-1
6	Electromagnetic Field and Waves	EFW	Core	4	2-1-1
7	Electronic Workshop	EWS	Core	2	2-0-0
					14-10-06
Total				22	30

Semester 3 Total Credit: 20					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Analog Communication	ANC	Hard	4	2-1-1
2	Analog Electronics	ANE	Hard	4	2-1-1
3	Electrical Engineering	ELE	Hard	4	3-0-1
4	Electronics Measurement and Instrumentation	EMI	Hard	3	2-0-1
5	Micro Processor Interface and Programming	MIP	Hard	4	2-1-1
6	Probability and Statistics	PAS	Hard	4	3-1-0
					13-08-10
Total				22	31

B.Tech. ECE 2022 Batch (Proposed Curriculum)

Semester 4 Total Credit: 21					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Discrete Time Signals and Systems	PC-EC-DTS-403	PCC	3	3-0-0-0
2	Control Systems	PC-EC-COS-404	PCC	4	3-0-2-0
3	Digital IC Design	PC-EC-DID-404	PCC	4	3-0-2-0
4	Integrated Circuit Technology	PC-EC-ICT-503	PCC	3	3-0-0-0
5	Antenna and Wave Propagation	PC-EC-AWP-404	PCC	4	3-0-2-0
6	Multi-Disciplinary Minor-1		MDM	3	3-0-0-0
Total				21	18-0-06-0
					24

Exit: After successful completion of 4 semesters, a student may get an exit option as per ordinance. They need to do *two courses* before exit.

Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Embedded System Design	PC-EC-ESD317	PCC	3	2-0-2-0
2	Mobile and Wireless Communication	PC-EC-MWC318	PCC	3	2-0-2-0

Semester 5 Total Credit: 21					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Embedded System Design	PC-EC-ESD317	PCC	3	2-0-2-0
2	Optical Communication	PC-EC-OPC319	PCC	3	2-0-2-0
3	Microwave Engineering	PC-EC-MWE315	PCC	3	2-0-2-0
4	Digital Communication	PC-EC-DCO316	PCC	3	3-0-0-0
5	Computer Networks		PCC	3	2-0-2-0
6	Multi-Disciplinary Minor-2	MD-xx-XXX303	MDM	3	3-0-0-0
7	Design Thinking and Innovation	HM-MS-DTI306	HSMC (AEC)	2	1-0-2-0
	SMT Workshop		VSEC	1	0-0-2-0
Total				21	17-0-12-0
					29

Semester 6 Total Credit: 20					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Digital Signal Processing	PC-EC-DSP313	PCC	4	3-0-2-0
2	Mobile and Wireless Communication	PC-EC-MWC318	PCC	4	3-0-2-0
3	Program Elective-I	PE-EC-xxx301	PEC	3	2-0-2-0
4	Project	PP-EC-PRJ301	VSEC	4	0-0-8-0
5	Multi-Disciplinary Minor-3	MD-xx-XXX304	MDM	3	3-0-0-0
6	Indian/Foreign Language Regional Language, Sanskrit, German, Japanese, French	HM-xx-XXX304	HSMC (AEC)	2	1-0-2-0
Total				20	12-0-16-0
					28

Exit: After successful completion of 6 semesters, a student any get an exit option as per ordinance. They need to do two courses before exit.

Sl. No.	Course Name	Code	Type	Credit	L-T-P-S
1	Skill based Elective – I		PCC	3	2-0-2-0
2	Skill based Elective - II		PCC	3	2-0-2-0

Summer Semester Total Credit: 3					
Sl. No.	Course Name	Code	Type	Credit	
1	Internship	PC-EC-ITP353	ELC	3	Credit will be added in VII Sem.

Note: Internship will be evaluated in the beginning of seventh semester. Its credit and grades will be reflected in the 7th Semester Grade Sheet.

Semester 7 Total Credit: 21					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Program Elective-II	PE-EC-xxx403	PEC	3	3-0-0-0
2	Program Elective-III	PE-EC-xxx404	PEC	3	3-0-0-0
3	Open Elective-I	OE-xx-xxx4xx	OEC	3	3-0-0-0
4	Multi-Disciplinary Minor-4	MD-xx-XXX405	MDM	3	3-0-0-0
5	a) History of Indian Civilizations, b) Kautilya's Arthashastra, c) Vedic Mathematics, d) Vedic Corpus, e) Wisdom from the Ages, f) Panini's Grammar	HM-MS-XXX08	HSMC (IKS)	2	2-0-0-0
6	Internship (Summer Semester)	PC-EC-ITP353	ELC	3	0-0-0-6
7	Mini Project		PEC	4	0-0-8-0
Total				21	14-0-8-6
					22+6

Semester 8 Total Credit: 14					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Major Project	PP-EC-PRJ403	ELC	8	0-0-16-0
2	*Program Elective-IV	PE-EC-xxx405	PEC	3	0-0-0-3
3	*Multi-Disciplinary Minor-5	MD-xx-XXX405	MDM	3	3-0-0-0
Total				14	3-0-16-6
					25

*8th Semester courses may be allowed to join via MOOC/NPTEL etc.

Honors:

- “Honors” is an additional credential, a student will earn if he/she opts for the extra 15 credits needed for this in his/her own discipline. The concerned department specifies the course requirements for earning the Honors.
- B.Tech.-ECE-Honor Course: Minimum 8 CGPI and No backlog.
- After 3rd Semester, students may choose extra credits for Honors.
- The 8th Semester project must be an academic project. At least one research publication in Tier I/II conferences or in SCI Journals communicated or one patent filed.

MMDM Baskets (for students admitted in July 2022):

Minor-I: Entrepreneurship & Innovation [1-Fundamentals of Entrepreneurship, 2-Social Entrepreneurship, 3-Entrepreneurial Finance, 4-Innovation Management, 5-Managing Corporate Entrepreneurship]

Minor-II: Economics & Finance for Engineers [1-Indian Economics, 2-Money and Banking, 3-Economics of Business Environment, 4-Start-up Economics, 5-Digital Economics]

Minor-III: Science of Happiness [1-Introduction to Science of Happiness, 2-Understanding Domains of Happiness, 3-Happiness Indices, 4-Assessment of happiness, 5-Independent Study of Science of Happiness]

Indian Institute of Information Technology, Allahabad
Department of Information Technology
B.Tech. IT-BIN curriculum
(2022 Batch)

Total Credit : 164

Semester 1 Total Credit: 20					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Physics	PHY	Core	4	2-1-1
2	Linear Algebra	LAL	Core	4	3-1-0
3	Introduction to Programming	ITP	Core	4	2-1-1
4	Fundamentals of Electrical & Electronics Engg.	FEE	Core	4	2-1-1
5	Professional Communication	PFC	Core	2	1-0-1
6	Principles of Management	POM	Core	2	1-1-0
					11-10-08
Total				20	29

Semester 2 Total Credit: 24					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Discrete Mathematical Structures	DMS	Core	4	3-1-0
2	Univariate and Multivariate Calculus	UMC	Core	4	3-1-0
3	Computer Organization and Architecture	COA	Core	4	2-1-1
4	Business Process Modeling	BPM		2	1-1-0
5	Data Structures	DST	Core	4	2-1-1
6	Principles of Communication Engineering	PCE	Core	4	2-1-1
7	Principle of Economics	POE	Core	2	2-0-0
					15-11-06
Total				24	32

Semester 3 Total Credit: 22					
Sl. No.	Course Name	Code	Type	Credit	L-T-P
1	Probability and Statistics	PAS	Hard	4	3-1-0
2	Theory of Computation	TOC	Hard	4	2-1-1
3	Object Oriented Methodologies	OOM	Hard	4	2-1-1
4	Operating System	OPS	Hard	4	2-1-1
5	Introduction to Finance	IOF	Hard	2	2-0-0
6	Introduction to Marketing	IOM	Hard	2	1-0-1
7	Foreign Language & Intercultural Studies*	FLIS		2	1-1-0
*can be floated in Semester 4 as will depending upon students enrolments					13-10-08
Total				22	31

B.Tech. IT-Bin 2022 Batch (Proposed Curriculum)

Semester 4 Total Credit: 23					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Design and Analysis of Algorithms		PCC	4	3-0-2-0
2	Principles of Programming Language		PCC	3	3-0-0-0
3	Computer Networks		PCC	4	3-0-2-0
4	Software Engineering		PCC	3	2-0-2-0
5	Database Management System		PCC	4	3-0-2-0
6	Foundations of FinTech		PCC	2	1-1-0-0
7	Multi-Disciplinary Minor-1		MDM	3	3-0-0-0
Total Credit				23	18-1-8-0
					27

Semester 5 Total Credit: 21					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Cyber Security	PC-IT-CSE301	PCC	4	3-0-2-0
2	Introduction to Machine Learning	PC-IT-IML302	PCC	4	3-0-2-0
3	Digital Marketing	PC-BI-DMK202	PCC	3	2-1-0-0
4	Artificial Intelligence	PC-IT-AIN304	PCC	3	3-0-0-0
5	Project – I (Research Methodology)	PC-IT-PRO351	PCC	2	0-0-4-0
6	Multi-Disciplinary Minor-2	MD-xx-XXX203	MDM	3	3-0-0-0
7	Design Thinking and innovation	HM-MS-DT306	HSMC (AEC)	2	1-0-2-0
					15-1-10-0
Total				21	26

Semester 6 TotalCredit:18					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Data Analytics	PC-IT-IML302	PCC	3	2-0-2-0
2	Project – II	PC-IT-PRJ352	PCC	4	0-0-8-0
3	Biology for Engineers	BS-AS-BFE301	BSC	2	2-0-0-0
4	Process Mining & Analytics	PC-BI-PM303	PCC	3	2-0-1-0
5	BI-Elective-1	PE-BI-XXX301	PEC	3	3-0-0-0
	BI-Elective-Basket: • Details appended				
6	Multi-Disciplinary Minor-3	MD-xx-XXX204	MDM	3	3-0-0-0
					12-0-11-0
Total				18	23

Exit: After successful completion of 6 semesters, a student may get an exit option as per ordinance after completion of the summer semester internship (3 credits) and additional 3 credit courses in summer.

Summer Semester TotalCredit:3					
Sl. No.	Course Name	Code	Type	Credit	
1	Internship	PC-IT-ITP353	ELC	3	Credit will be added in VII Sem.

Note: Internship will be evaluated in the beginning of seventh semester. Its credit and grades will be reflected in 7th semester Grade sheet.

Semester 7 Total Credit:24					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Minor Project	PCITPRJ4 51	PCC	4	0-0-8-0
2	Big Data Analytics	PEBIXX X403	PCC	3	2-0-2-0
3	Elective-3 BI-Elective II: IT Project Management + IT Electives	PEITXXX 404	PCC	3	3-0-0-0
4	Open Elective-1	OEZZXX X4SS	OEC	3	3-0-0-0
5	a) History of Indian Civilizations, b) Kautiliya's Arthashastra, c) Vedic Mathematics, d) Vedic Corpus, e) Wisdom from the Ages, f) Panini's Grammar	HM-MS- XXX408	HSMC (IKS)	2	2-0-0-0
6	Internship (Summer Semester)	PC-IT- TO353	ELEC	3	0-0-0-6-0
7	Multi-Disciplinary Minor-4	MD-xx- XXX204	MDM	3	3-0-0-0
					13-0-10-06
Total				21	29

Semester 8 Total Credit:15					
Sl. No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Major Project	PC-IT- PRJ452	ELC	6	0-0-12-0
2	*Elective-4	PE-IT- XXX402	PEC	3	3-0-0-0
3	*Open Elective-2	OE-ZZ- XXX4SS	OEC	3	3-0-0-0
4	*Multi-Disciplinary Minor-5	MD-xx- XXX204	MDM	3	3-0-0-0
					9-0-12-0
Total				15	21

8th Semester courses may be allowed to join via MOOC/ NPTEL.

MMDM Baskets (for students admitted in July 2022):

Minor-I: Entrepreneurship & Innovation [1-Fundamentals of Entrepreneurship, 2-Social Entrepreneurship, 3-Entrepreneurial Finance, 4-Innovation Management, 5-Managing Corporate Entrepreneurship]

Minor-II: Economics & Finance for Engineers [1-Indian Economics, 2-Money and Banking, 3-Economics of Business Environment, 4-Start-up Economics, 5-Digital Economics]

Minor-III: Science of Happiness [1-Introduction to Science of Happiness, 2-Understanding Domains of Happiness, 3-Happiness Indices, 4-Assessment of happiness, 5-Independent Study of Science of Happiness]

Annexure-B: Identified MMDMs

	MMDM-I	MMDM-II	MMDM-III	MMDM-IV	MMDM-V
Title	Entrepreneurship & Innovation	Economics & Finance for Engineers	Science of Happiness	Biological Data Analytics	Medical Diagnostics and Therapeutic Technology
Courses	Fundamentals of Entrepreneurship	Indian Economics	Introduction to Science of Happiness	Proteomics and Genomics	Basics of Human Anatomy & Physiology
	Social Entrepreneurship	Money and Banking	Understanding Domains of Happiness	Next Generation Sequencing	Biomedical Instrumentation
	Entrepreneurial Finance	Economics of Business Environment	Happiness Indices	Cheminformatics for Engineers	Bio-MEMs and Nanotechnology
	Innovation Management	Start-up Economics	Assessment of happiness	Systems Biology and Modeling	Medical Imaging
	Managing Corporate Entrepreneurship	Digital Economics	Independent Study of Science of Happiness	Molecular Structure Prediction	Tissue engineering and Gene therapy

Course Curriculum

2023 Batch

B.Tech 2023 Batch (IT / ECE / IT-Bin)



Annexure 26.07

Indian Institute of Information Technology - Allahabad

Deoghat, Jhalwa- 211015, Prayagraj, Uttar Pradesh

Department of Information Technology

NEP-2020 Based BTech-IT- UG curriculum

(With effect from July 2023)

Total Credit : 160

Lecture-L: 1 Credit = 1 hr/ week

Practical-P: 1 Credit = 2 hr/week

Tutorial-T: 1 Credit = 1hr/week

Self Study-S: 1 Credit= 1 hr/week

Multidisciplinary BTech-IT Program: Sem-wise Credit Dist.- One Major, One Minor

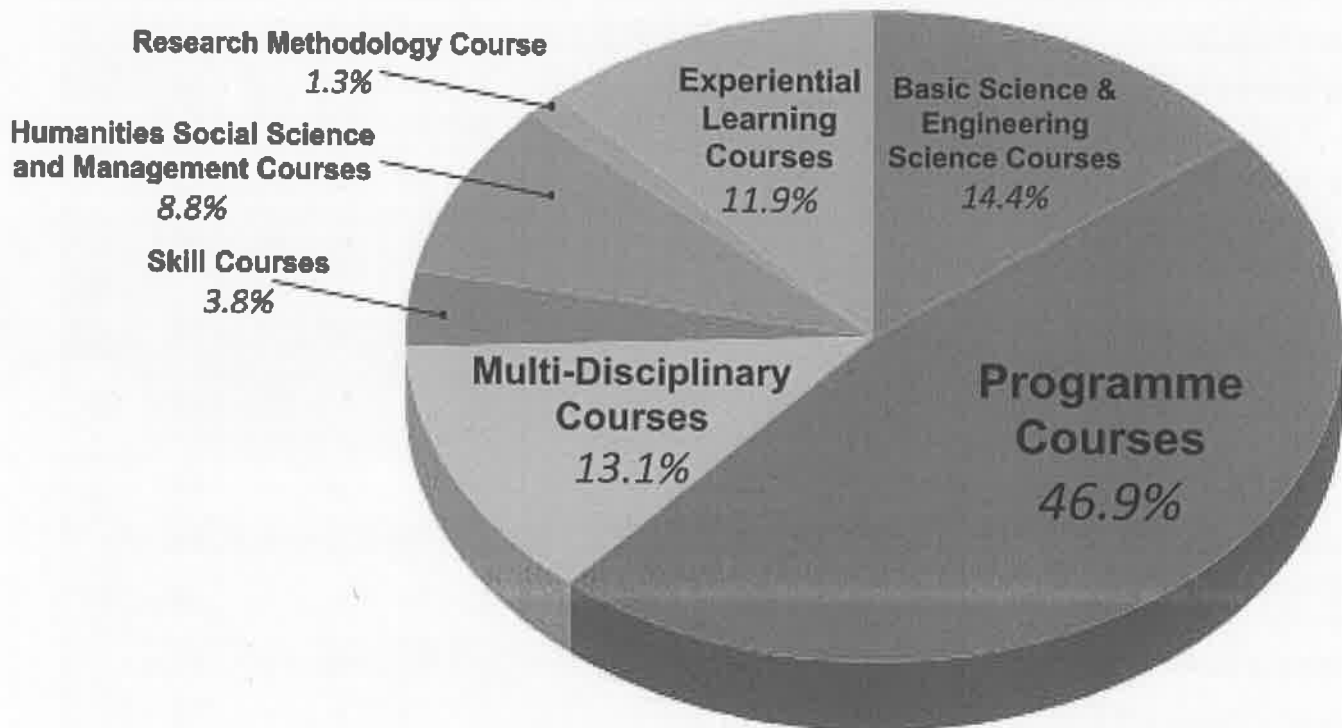
Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits	
Basic Science Course	BSC/ESC	08	–	03	--	--	02	--	--	13	23
Engineering Science Course		07	03		--	--	--	--	--	10	
Programme Core Course (PCC)	Programme Courses	--	12	14	18	13	03	--	--	60	75
Programme Elective Course (PEC)		--	--	--	--	--	06	06	03	15	
Open/School Elective (OE/SE) other than particular program	Multi-disciplinary	--	--	--	--	--	--	03	03	06	21
Multidisciplinary Minor (MD M)		--	--	03	03	03	03	03	--	15	
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	--	02		--	--	06	06
Ability Enhancement Course (AEC-01)	Humanities Social Science and Management	02	--	--	--	--	--	--	--	02	14
Indian Language (AEC-02)		--	--	--	--	--	02	--	--	02	
Entrepreneurship/Economics/Management Courses		--	02	02	--	02	--	--	--	06	
Indian Knowledge System (IKS)		--	--	--	--	--	--	02	--	02	
Value Education Course (VEC)		01	01	--	--	--	--	--	--	02	
Research Methodology (RM)	RM	--	--		--	02	--	--	--	02	02
Internship	Experiential Learning Courses	--	--		--	--	--	03	06	17	
Project		--	--		--	--	04	04			
Community Engagement Activity (CEA)/Field Project		--	--	02	--	--	--	--	--		02
Co-curricular & Extracurricular Activities (CCA)	Liberal Learning Course	--	--	--	--	--	--	--	--	0	0
Total Credits (One Major, One Minor degree)		20	20	24	21	22	20	21	12	160	160



Indian Institute of Information Technology - Allahabad

Deoghat, Jhalwa- 211015, Prayagraj, Uttar Pradesh

Department of Information Technology





Indian Institute of Information Technology - Allahabad

Deoghat, Jhalwa- 211015, Prayagraj, Uttar Pradesh

Department of Information Technology

Curriculum

Semester 1 Total Credit : 20						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Engineering Physics	BS-AS-EGP102	BSC	4	3-0-2-0	
2	Linear Algebra	BS-AS-LAL101	BSC	4	3-1-0-0	
3	Problem Solving with Programming	ES-IT-PSP101	ESC/VSEC	5 (3/2)	3-0-4-0	
4	Fundamentals of Electrical & Electronics Engineering	ES-EC-FEE101	ESC	4	3-0-2-0	
5	Technical Communication Skills	HM-MS-TCS101	HSMC (AEC)	2	1-0-2-0	
6	Constitution of India	HM-XX-COI107	HSMC (VEC)	1	1-0-0-0	
				Total	20	14-1-10-0
						25

Semester 2 Total Credit : 20						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Discrete Mathematical Structures	PC-IT-DMS101	PCC	4	3-1-0-0	
2	Computer Organization and Architecture	PC-IT-COA102	PCC	4	3-0-2-0	
3	Data Structures and Algorithms	PC-IT-DSA103	PCC	4	3-0-2-0	
4	Web Development	VS-IT-WEB101	VSEC	2	0-0-4-0	
5	Principles of Data Communication	ES-EC-PCE102	ESC	3	3-0-0-0	
6	Principles of Management	HM-MS-POM102	HSMC (AEC)	2	1-0-2-0	
7	Environmental Studies	HM-XX-EMS105	HSMC (VEC)	1	1-0-0-0	
				Total	20	14-1-10-0
						25

Exit: After successful completion of one year (first two semesters), a student may get an exit option as per ordinance. They need to do **Skill Based Courses of 6 credits additional**, in summer, before exit. Department will provide a list of such courses.



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Semester 3 Total Credit : 24						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Probability and Statistics	BS-AS-PNS201	BSC	3	2-1-0-0	
2	Object Oriented Methodologies	PC-IT-OOM201	PCC	4	3-0-2-0	
3	Theory of Computation	PC-IT-TOC202	PCC	3	2-1-0-0	
4	Operating System	PC-IT-OPS203	PCC	4	3-0-2-0	
5	Software Engineering	PC-IT-SOE204	PCC	3	2-0-2-0	
6	<i>Multi-Disciplinary Minor-1</i>	MD-xx-XXX201	MDM	3	3-0-0-0	
7	Principles of Economics or Introduction to Finance	HM-MS-POE208 HM-MS-ITF208	HSMC (AEC)	2	2-0-0-0	
8	Community Services NCC, NSS, Yoga, Unnat Bharat Abhiyaan-UBA, Ek Bharat Shreshtha Bharat-EBSB, NGO, Prayas, etc.	CE-xx-XXX209	HSMC (CEA)	2	0-0-0-2	
				Total	24	16-2-10-2
						30

Semester 4 Total Credit : 25						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Design and Analysis of Algorithms	PC-IT-DAA205	PCC	4	3-0-2-0	
2	Principles of Programming Language	PC-IT-PPL206	PCC	3	3-0-0-0	
3	Computer Networks	PC-IT-CNE207	PCC	4	3-0-2-0	
4	Computer Graphics and Visualization	PC-IT-CGV208	PCC	3	2-0-2-0	
5	Database Management System	PC-IT-DMS209	PCC	4	3-0-2-0	
6	<i>Multi-Disciplinary Minor-2</i>	MD-xx-XXX202	MDM	3	3-0-0-0	
				Total	21	17-0-8-0
						25

Exit: After successful completion of 4 semesters, a student may get an exit option as per ordinance.

They need to do **Skill Based Courses of 6 credits, additional**, in summer, before exit. Department will provide a list of such courses.



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Semester 5 Total Credit : 22						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Cyber Security	PC-IT-CSE301	PCC	4	3-0-2-0	
2	Introduction to Machine Learning	PC-IT-IML302	PCC/VS EC	4 (3/1)	3-0-2-0	
3	Image and Video Processing	PC-IT-IVP303	PCC/VS EC	4 (3/1)	3-0-2-0	
4	Artificial Intelligence	PC-IT-AIN304	PCC	3	2-0-2-0	
5	Project - I (Research Methodology)	PC-IT-PRO351	ELC	2	0-0-4-0	
6	<i>Multi-Disciplinary Minor-3</i>	MD-xx-XXX203	MDM	3	3-0-0-0	
7	Design Thinking and Innovation	HM-MS-DTI306	HSMC (AEC)	2	1-0-2-0	
				Total	22	15-0-14-0 29

Semester 6 Total Credit : 20						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Data Analytics	PC-IT-DAN305	PCC	3	2-0-2-0	
2	Project - II	PC-IT-PRJ352	ELC	4	0-0-8-0	
3	Biology for Engineers	BS-AS-BFE301	BSC	2	2-0-0-0	
4	Elective-1	PE-IT-XXX401	PEC	3	3-0-0-0	
5	Elective-2	PE-IT-XXX402	PEC	3	3-0-0-0	
6	<i>Multi-Disciplinary Minor-4</i>	MD-xx-XXX204	MDM	3	3-0-0-0	
7	Indian/Foreign Language <i>Regional Language, Sanskrit, German, Japanese, French</i>	HM-xx-XXX304	HSMC (AEC)	2	1-0-2-0	
				Total	20	14-0-12-0 26

Exit: After successful completion of 6 semesters, a student may get an exit option as per ordinance after completion of the summer semester internship (3 credits) and additional 3 credit courses in summer.

Summer Semester Total Credit : 3					
Sl.No.	Course Name	Code	Type	Credit	
1	Internship	PC-IT-ITP353	ELC	3	<i>Credit will be added in VII Sem.</i>

Note: Internship will be evaluated in the beginning of seventh semester. Its credit and grades will be reflected in the 7th semester Grade sheet.



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Semester 7 Total Credit : 21						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Minor Project	PC-IT-PRJ451	ELC	4	0-0-8-0	
2	Elective-3	PE-IT-XXX403	PEC	3	3-0-0-0	
3	Elective-4	PE-IT-XXX404	PEC	3	3-0-0-0	
4	Open Elective-1	OE-ZZ-XXX4SS	OEC	3	3-0-0-0	
5	<i>Multi-Disciplinary Minor-5</i>	MD-xx-XXX205	MDM	3	3-0-0-0	
6	<i>History of Indian Civilizations/ Kautilya's Arthashastra/ Vedic Mathematics/ Vedic Corpus/ Wisdom from the Ages/ Panini's Grammar</i>	HM-MS-XXX408	HSMC (IKS)	2	2-0-0-0	
7	Internship (Summer Semester)	PC-IT-TO353	ELC	3	0-0-0-6	
				Total	21	14-0-8-6 6+22

Semester 8 Total Credit : 12						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Major Project	PC-IT-PRJ452	ELC	6	0-0-12-0 0-0-0-6 *	
2	Elective-5	PE-IT-XXX402	PEC	3	3-0-0-0 0-0-0-3 *	
3	Open Elective-2	OE-ZZ-XXX4SS	OEC	3	3-0-0-0 0-0-0-3 *	
				Total	12	6-0-12-0 18

* 8th Semester courses may be allowed to join via MOOC / NPTEL etc. Major projects may be completed as Internship cum projects.



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Honors

- “Honors” is an additional credential a student will earn if he/ she opts for the extra 15 credits needed for this in his/ her own discipline. The concerned department specifies the course requirements for earning the Honors.
- BTech- IT- Honor Course: Minimum 8 CGPI and No backlog.
- After 3rd semester, students may choose extra credits for Honors
- The 8th Semester project must be an academic project. At least one research publication in Tier I/II conferences or in SCI Journals communicated or one patent filed.

Multidisciplinary Minor Cyber Security & Forensics

Sl.No.	Course Name	Course Code	Semester	Credits	Hours
					L-T-P
1	Cyber Security and Digital Forensics	MD-IT-CSD202	IV	3	2-0-2
2	Cyber Law and Security Standards	MD-IT-CLS203	V	3	2-1-0
3	Blockchain Technology	MD-IT-BCT204	VI	3	2-0-2
4	Intrusion Detection System	MD-IT-IDS205	VII	3	2-0-2
5	Self Study/ Project	MD-IT-IDS205	VII	3	0-0-6
Total				15	08-01-12 21

Note: Department will float other minors in future.



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NEP Compliant Curriculum: HSM Courses to be included in UG Programs

Semester	Course category	Course Title	L-T-P-S	Credits	Course sub-category (*)
I	HSMC-01	Technical Communication Skills	1-0-2-0	02	AEC
I	HSMC-02	Constitution of India	1-0-0-0	01	VEC
II	HSMC-03	Principles of Management	2-0-0-0	02	--
II	HSMC-04	Environmental Studies	1-0-0-0	01	VEC
III	HSMC-05	Principles of Economics/Introduction to Finance	2-0-0-0	02	
III	HSMC-06	Active Participation in One of the following: NCC, NSS, Yoga, Unnat Bharat Abhiyaan-UBA, Ek Bharat Shreshtha Bharat-EBSB, NGO, etc.	0-0-0-2	02	CEA
V	HSMC-07	Design Thinking and Innovation	2-0-0-0	02	--
VI	HSMC-08	Indian/Foreign Language (One of the Following) Regional Language/German/Japanese	2-0-0-0	02	AEC
VII	HSMC-09	(One of the following) a) <i>History of Indian Civilizations</i> b) <i>Kautilya's Arthashastra</i> c) <i>Vedic Mathematics</i> d) <i>Vedic Corpus</i> e) <i>Wisdom from the Ages</i> f) <i>Panini's Grammar</i>	2-0-0-0	02	IKS
Total:			13-0-2-2	16	

- **AEC: Ability Enhancement Course**
- **IKS: Indian Knowledge System**
- **VEC: Value Education Course**
- **CEA: Community Engagement Activity**



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Syllabus Ist Year Courses



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Subject Name		Problem Solving with Programming (PSP)		
Subject Code		Credits		5
Scheme (L-T-P)		3-0-4	Instruction	3 Hours/week (L) 4 Hours/week (P)
Course Objectives		<ul style="list-style-type: none"> To make students aware of history and advancement in Computer Science. To make students aware about the Computers and its related ecosystem. To introduce the first programming language (in this case C language) To develop a problem solving approach in students with a programmer's perspective. To acquaint students with various engineering problems and a beginners approach to solve them 		
Course Outcomes		<ul style="list-style-type: none"> Students will be aware of the basic computer science advancements and its history. Students will be aware about the common computer science equipment, jargon and ecosystem. Students will have a thorough knowledge of the C programming language. Students will be able to address a given programming problem in a structured manner similar to industry standards. Students will be aware of the latest engineering problems and feel confident in handling them in future. 		
Unit	Content			Hours Lecture (Lab)
1	<ul style="list-style-type: none"> Introduction to Computers & Demo: History of Computers, Engineering in the 21st Century, Recent Engineering Achievements, Changing Engineering Environment, Computer hardware, Memory, CPU, Input/ Output devices, Computer Networks, LAN, File Server, WAN, WWW, GUI/CLI, Ethernet, Wi-Fi, Modem, Switches, Routers, IP Address, Proxy, Gateway; Operating Systems, Installation/Uninstallation, Disk/Directory/Files system, Application Software; Professional Ethics for Computer Programmers 			4 (4) [TB1, TB2-Ch.1]
2	<ul style="list-style-type: none"> Introduction to Computer Languages (Machine Language, Assembly Language, High Level languages), History of C, Software Development Life Cycle; Compiling and running a Program on Visual Studio on Windows, GNU gcc on Linux, and in a GCC Docker Container. Structure of a simple C program (preprocessor directive, #include and #define directives, header files and library files) Debugging, Testing and Documentation (compiler error, linker error, and run-time error), Constants and Variables, Basic Data Types, Assignment Statements, Arithmetic Operators, Constants/ Literals, Expressions, Statements and Comments. Standard Input and Output, Mathematical Functions, Character Functions, Character I/O, Character Comparisons. 			8 (10) [TB1-Ch1, Ch.2, Ch.3] [TB2-Ch. 2, 9]
3	<ul style="list-style-type: none"> Structured Programming: Problem analysis (requirement analysis, program design), Algorithms Pseudocode and Flowchart, Operators (Relational, Logical, Boolean, Ternary, Bitwise, Conditional, Sizeof, Comma), Precedence and Associativity, implicit and explicit type conversion, Selection Statements (Simple if, if/else, switch), Loop Structures (while, do/while, for, exit, break and continue) Data Files: I/O Statements, Reading data files (Specified Number of Records, Trailer or Sentinel Signals, End-of-File, Generating data files. 			9 (12) [TB1-Ch. 3] [TB2-Ch. 3, 4, 5, 11]



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4	<ul style="list-style-type: none"> ● Modular Programming: User defined functions, function definition, prototype, parameter list, Function Arguments and Return Types, Storage class and Scope, Function call, Macros, Nested and Recursive Function ● Array: One Dimensional arrays (Definition and Initialization, Computations and Output, Function Arguments), Passing Arguments by Value, Passing Arguments by Address, Two Dimensional Arrays (Definition and Initialization, Computations and Output, Function Arguments), Higher dimensional Arrays 	6 (8) [TB1-Ch. 4, 5] [TB2-Ch. 5, 6]
5	<ul style="list-style-type: none"> ● Pointer: Addresses and Pointers, Address Operator, Pointer Assignment, Address Arithmetic, Chain of Pointers, Pointers to Array Elements: 1-D Arrays, 2-D Arrays. Array of Pointers, Pointers as Function Arguments, Function Returning pointers. ● Character Strings, String Definition and I/O, Null Character, String Library Functions (String length, string copy, string concatenation, string compare), Pointers and Strings. 	9 (12) [TB1-Ch.6] [TB2-Ch. 7, 8]
6	<ul style="list-style-type: none"> ● Dynamic Memory Allocation (calloc(), malloc(), realloc(), free()) ● Structures: Definition and Initialization, Input and Output, Structures as Function Arguments, Functions returning Structures, Array of Structures, passing array of structure to function, Nested Structures, Unions ● Bitwise operators, Bit fields, Enumeration ● Pointer to Structure, Dynamic Data Structure: Linked List, Stack, Queue. 	6 (10) [TB1-Ch.7] [TB2-Ch. 10, 12]

Text Book [TB]

1	Engineering Problem Solving with C, 4th Ed. (2016) by Delores M. Etter, Pearson
2	C: How to Program, 9th Edition (2023) by Paul Deitel and Harvey Deitel, Pearson

Reference Book [RB]

1	Computer Systems: A Programmer's Perspective, 3rd Edition by Randal E Bryant and David R O'Hallaron, Pearson
2	Problem Solving and Program Design in C, 8th Global Edition. by Jeri R. Hanly and Elliot B. Koffman, Pearson
3	Programming in C, Brian Kernighan and Dennis Ritchie



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Subject Name	Linear Algebra		
Course Type (Core/Elective)	Core		
Subject Code		Credits	4
Scheme (L-T-P)	3-1-0	Instruction	3 Hours/week (L) 1 Hours/week (T)

- Objective of the Course:** Solving systems of linear equations, understanding vector spaces, linear transformations, eigenvalue, eigenvector, generalized notion of angle, distance, and length, diagonalization and orthogonalization, finding least square solutions and singular value decomposition.
- Outcome of the Course:** To be able to solve systems of linear equations, work within vector spaces, to manipulate matrices and to do matrix algebra.
- Course Plan:**

Unit	Topics for Coverage
Unit 1	System of linear equation, Gauss elimination method, Elementary matrices, Invertible matrices, Gauss-Jordan method for finding inverse of a matrix, Determinant, Cramer's rule, Vector spaces, Linearly independence and independence, Basis, Dimension.
Unit 2	Linear transformation, Representation of linear maps by matrices, Rank-Nullity theorem, Rank of a matrix, Row and column spaces, Solution space of a system of homogeneous and non-homogeneous equations, Inner product space, Cauchy-Schwarz inequality, Orthogonal basis.
Unit 3	Gram-Schmidt orthogonalization process, Orthogonal projection, Eigenvalue, eigenvector, Cayley-Hamilton theorem, Diagonalizability and minimal polynomial, Spectral theorem.
Unit 4	Positive, negative and semi definite matrices. Decomposition of the matrix in terms of projections, Strategy for choosing the basis for the four fundamental subspaces, Least square solutions and fittings, Singular value decomposition, Primary decomposition theorem, Jordan canonical form.

4. Text Books/References:

- Gilbert Strang, Introduction to Linear Algebra, 4th Edition, Cambridge Press (2009).
- K. Hoffman and R. Kunze, Linear Algebra, 2nd Edition, Pearson (2015).
- S. Kumaresan, Linear algebra - A Geometric approach, Prentice Hall of India (2000).
- S. Lang, Introduction to Linear Algebra, 2nd Edition, Springer (2012).



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Subject Name	Engineering Physics		
Course Type (Core/Elective)	Core		
Subject Code		Credits	4
Scheme (L-T-P)	3-0-2	Instruction	3 Hours/week (L) 2 Hours/week (P)

1. Objective of the course:

- Demonstrate ability to collect, process, and analyze scientific data. Display critical thinking skills in applying physics knowledge in the experimental process.
- To impart knowledge in basic concepts of physics relevant to engineering applications.
- To introduce advances in technology for engineering applications.

2. Outcome of the course:

- To design and conduct simple experiments as well as analyze and interpret data in engineering applications.
- Capability to understand advanced topics in engineering
- Identify formula and solve engineering problems
- Apply quantum physics to electrical phenomena

3. Course Plan:

Unit	Topics for Coverage
Unit 1	Classical Mechanics: Symmetry and conservation laws, Fermat's principle, Principle of least action, Euler Lagrange equations and its applications, Degrees of freedom, Constraints and constraint forces, Generalized coordinates, Lagrange's equations of motion, Generalized momentum, Ignorable coordinates, Concept of phase space, Hamiltonian, Hamilton's equations of motion and applications.
Unit 2	Quantum Mechanics: De Broglie's hypothesis. Uncertainty Principle, wave function and wave packets, phase and group velocities. Schrödinger Equation. Probabilities and Normalization. Expectation values. Eigenvalues and eigenfunctions. Infinite potential well and energy quantization. Finite square well, potential steps and barriers - notion of tunneling, Electron in periodic potential and band structure of solid.



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Unit 3	<p>Solid State Physics: Introduction, Energy Bands in conductors, semiconductors (intrinsic and extrinsic), insulators, Carrier transport in semiconductor (diffusion current, drift current) mobility and resistivity. Generation and recombination of carriers in semiconductors.</p> <p>Donors and acceptors in the band model, electron effective mass, Density of states, Thermal equilibrium, Fermi-Dirac distribution function for electrons and holes, Fermi energy. Equilibrium distribution of electrons & holes.</p> <p>The n-p product and the intrinsic carrier concentration at extremely high and low temperatures, Variation of Fermi energy with doping concentration and temperature. Mechanism of carrier scattering, Einstein relationship between diffusion coefficient and mobility</p>
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6. Text Book:

- Classical Mechanics; H. Goldstein, C. Poole, J. Safko.
- Introduction to Quantum Mechanics by D . J. Griffiths Modern Physics by A. Beiser.
- Physics of semiconductor devices, S M Sze, John Wiley & Sons, 2006.;

7. References:

- Theoretical Mechanics by M. Spiegel. Feynman Lectures of Physics Vol-1 and Vol-3.
- Quantum Physics for Atoms, Molecules, Solids, Nuclei and Particles by R Eisberg and R. Resnick.
- Modern Semiconductor Devices for Integrated Circuits, Chenming Hu.



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Subject Name	Discrete Mathematical Structures		
Course Type (Core/Elective)	Core		
Subject Code		Credits	4
Scheme (L-T-P)	3-1-0	Instruction	3 Hours/week (L) 1 Hours/week (T)

- Objective of the course: This is an introductory *course on discrete mathematics and structures*. Students will learn: some fundamental mathematical concepts and terminology.
- Outcome of the course: On completion of this course, students will be able to explain and apply the basic methods of discrete (non-continuous) mathematics in Computer Science. They will be able to construct direct and indirect proof of the theorem. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.
- Course Plan:**

Unit	Topics for Coverage
Unit 1	Proof methods and strategies: Forward proof, Proof by contradiction, Proof by contraposition, Proof by induction. Mathematical Induction- weak and strong induction. Proof of necessity and sufficiency, Case analysis.
Unit 2	Logic: Introduction to Logic. Propositional Logic, Truth tables, Deduction, Resolution, Predicates and Quantifiers. Languages of logic and first order logic. Semantics of first order logic, interpretations and its use in evaluating a formula. Semantic entailment: Validity and satisfiability. What is a proof system?
Unit 3	Sets, Relations and Functions: Operations and laws of set. Cartesian products, Binary relation, Partial order relation-Poset and Lattice, Equivalence relation. Image of a set, sum and product of function. Bijective function, Inverse and composite function. Size of a set: finite and infinite set. Countable and Uncountable sets, Cantor's diagonalization. Power set theorem.
Unit 4	Modular arithmetics and Combinatorics: Euclid's greatest common divisor algorithms, The Fundamental theorem of algorithms, modular arithmetics, Chinese remainder theorem. Permutation and combinations, Principle of Inclusion and Exclusion, Pigeon Hole Principle. Linear Recurrence relations - methods of solutions. Generating Functions.
Unit 5	Graphs: Graphs. Connected components, paths, cycles, Trees (Basics), Hamiltonian and Euler paths and walks, Coloring, Planarity.
Unit 6	Algebraic Structures: Binary operation, Groups, Semigroups, Monoids. Rings, Fields, Finite Field. Homomorphism and Isomorphism.

- Text Books:
 - Discrete Mathematics and its Applications, Kenneth H. Rosen, 8th Edition -Tata McGraw Hill Publishers, 2019.
 - Elements of Discrete Mathematics, C L Liu and D P Mohapatra, Tata McGraw Hill Publishers, 2008.
 - Logic in Computer Science, Huth and Ryan, Cambridge University Press, 2014.
- References:
 - Mathematics for Computer Science, Eric Lehman; F Thomson Leighton; Albert R Meyer, 2010.
 - Discrete Mathematics, N L Biggs, Oxford University Press, 2002.



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Subject Name	Computer Organization and Architecture		
Course Type (Core/Elective)	Core		
Subject Code		Credits	4
Scheme (L-T-P)	3-0-2	Instruction	3 Hours/week (L) 2 Hours/week (P)

- Objective of the course: A student should grasp the basic concepts of computer architecture and organization, and understand the key skills of constructing cost-effective computer systems. A student should learn how to quantitatively evaluate different designs and organizations, and provide quantitative arguments in evaluating different designs. A student should be able to articulate design issues in the development of processors or other components that satisfy design requirements and objectives. In addition, a student should experience use of design tools to model various alternatives in computer design
- Outcome of the course: To teach undergraduate students the basic operations of computing hardware and how it interfaces to software, to provide the understanding of system-level programming and provide a high-level understanding of the role played by compilers, assemblers, instruction sets, and hardware. Understand the merits and pitfalls in computer performance measurements; Understand the design process of a computer and critical elements in each step; Understand memory hierarchy and its impact on computer cost/performance; Understand alternatives in cache design and their impacts on cost/performance Understand the impact of instruction set architecture on cost-performance of computer design; Understand contemporary microprocessor designs and identify various design techniques employed; Use a set of hardware simulators to model a complex processor at the behavioral level; Use tools for modeling various microprocessor design alternatives
- Course Plan:

Unit	Topics for Coverage
Unit 1	Introduction - Overview of Computer Organisation and Architecture; Basic organization of computer and block level description of the functional units; Evolution of Computers, Von Neumann model Review of Digital Systems - Combinatorial and Sequential logic elements, Memory system design: semiconductor memory technologies, memory organization; Concept of Finite State Machine Binary Data representation, Signed Number representation, Fixed and Floating point data representations. IEEE 754 floating point number representation
Unit 2	Computer Arithmetic and Design of ALU - Integer Data computation: Addition, Subtraction, Multiplication: Signed multiplication, Booth's algorithm, Division of integers: Restoring and non-restoring division Floating point arithmetic: Addition, subtraction, multiplication and division. Case study : Design of 8/16/32 bit ALU
Unit 3	CPU Architecture, Register Organization , Instruction formats, basic instruction cycle, Instruction interpretation and Sequencing, RTL interpretation of instructions, addressing modes, instruction set. Case study 1- instruction sets of MIPS processor; Assembly language programming using MIPS instruction set Case study 2- instruction sets of ARM processor (RISC based processor); Assembly language programming using ARM instruction set



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Unit 4	Introduction to Memory and Memory parameters. Classifications of primary and secondary memories. Types of RAM and ROM, Allocation policies, Memory hierarchy and characteristics. Memory interleaving Cache memory: Concept, architecture (L1, L2, L3), mapping techniques. Cache Coherency, Interleaved and Associative Memory Virtual Memory: Concept, Segmentation and Paging , Page replacement policies.
Unit 5	Data Path and Control Unit design - Introduction to buses and connecting memory to CPU, Memory, bus structure CPU control unit design: hardwired and micro-programmed design approaches, Case study - design of a simple CPU
Unit 6	I/O Organization and Peripherals : Input-output subsystems, I/O transfers - program controlled, interrupt driven and DMA, privileged and non-privileged instructions, software interrupts and exceptions.
Unit 7	Assessing and Enhancing Performance of Computer Systems; Enhancing Performance - Pipeline Processing, instruction pipelining, pipeline stages and pipeline hazards; Parallel Processing Concepts - Flynn's classifications; Specialized Architectures - Multi-core systems, GPU

4. Text Book:

- David A. Patterson and John L. Hennessy,, Computer Organization and Design: The Hardware/Software Interface Morgan Kaufmann ARM Edition, 2010.

5. References:

- Carl Hamachar, Zvonco Vranesic and Safwat Zaky, Computer Organization, McGraw Hill
- William Stallings, Computer Organization and Architecture: Designing for Performance, Pearson Education
- John P. Hayes , Computer Architecture and Organization, McGraw Hill
- Morris Mano , Computer System Architecture, Pearson Education

6. Course Plan for the Lab Component:

- Familiarization with assembly language programming – using /simulators such as MARS/SPIM and ARM based emulators(emuARM)
- Synthesis/design of simple data paths and controllers, processor design – using Verilog Hardware description language and FPGA board to synthesize the designs.
- Parallel Programming on multicore architecture
- GPU Programming



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Subject Name	Data Structures and Algorithms		
Course Type (Core/Elective)	Core		
Subject Code		Credits	4
Scheme (L-T-P)	3-0-2	Instruction	3 Hours/week (L) 2 Hours/week (P)

- Objective of the course: To teach the linear and non-linear structures in which data can be stored and their pros and cons. To appreciate the need and working of different ways of storing data and using them for different applications. To write algorithms that make use of different data structures.
- Outcome of the course: The students will learn different structures by which data can be stored, retrieved and modified. This forms the foundations for the course on algorithms and a sound knowledge is used in almost every course and project work prescribed by the institute. The course emphasizes on lab work wherein the students learn not only to make different data structures and algorithms, but also their application in different synthetic problems.
- Course Plan:

Unit	Topics for Coverage
Unit 1	Introduction, Complexity Analysis, Recursion, Searching, Sorting
Unit 2	Linked List, Abstract Data Types, Stacks and Queues
Unit 3	Trees, Traversal, Binary Search Tree, Height Balanced Tree (AVL Tree), Heap, Priority Queue, Heap Sort, Hashing, Dictionaries.
Unit 4	Graphs, Graph Representation, Graph Traversal - DFS, BFS, Minimum Spanning Tree - Prim's and Kruskal's, Single Source Shortest Path - Dijkstra; Geometric data structures.

4. Text Book:

- E. Horowitz, S. Sahni, S. Anderson-Freed, Fundamentals of Data Structures in C, Second Edition, 2008.
- Y. Langsam, M. J. Augenstein, A. M. Tenenbaum, Data Structures Using C and C++, PHI, New Delhi, 2001.
- Data Structures and Algorithm Analysis in C (DSAC) by Mark Allen Weiss, Second Edition, 2002

5. References:

- Algorithms Design by Jon Kleinberg and Eva Tardos, Pearson, 2013
- The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall
- T. H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, Introduction to Algorithms 3rd ed., PHI, New Delhi, 2009.



Indian Institute of Information Technology - Allahabad

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Department of Information Technology

Subject Name	Principles of Communication Engineering		
Course Type (Core/Elective)	Core		
Subject Code		Credits	3
Scheme (L-T-P)	2-0-2	Instruction	2 Hours/week (L) 2 Hours/week (P)

3. Objective of the course: Exposure to fundamental concepts of signals and systems, communication technologies and information theory.

4. Outcome of the course: The students will be prepared to take courses on Computer Networks, Cyber Security and other related areas.

5. Course Plan:

Unit	Topics for Coverage
Unit 1	Signals and Transformations; Fourier Transform; LTI Systems; Convolution and LTI System Properties, Sampling theorem; Quantization – Linear, nonlinear; Pulse Code Modulation.
Unit 2	Information and Entropy: Entropy, Joint Entropy and Conditional Entropy, Relative Entropy and Mutual Information, Relationship Between Entropy and Mutual Information, Chain Rules for Entropy, Relative Entropy, and Mutual Information. Channel Capacity Coding: Source Coding- Prefix codes, Huffman Coding, Lempel Ziv Source coding Error Control Coding – Parity Check Codes, Cyclic Redundancy Checks
Unit 3	Transmission Media: Wired- Magnetic Media, Twisted Pairs, Coaxial Cable, Optical Fiber. Wireless- The Electromagnetic Spectrum, Radio Transmission, Microwave Transmission, Infrared Transmission, Light Transmission.
Unit 4	Digital Modulation: Modulation and Demodulation of Digital modulation schemes-ASK, FSK, PSK, DPSK, QPSK. Constellation diagram, M-ary Digital carrier Modulation. Multiplexing: Frequency Division Multiplexing, Wavelength Division Multiplexing, Time Division Multiplexing, Code Division Multiplexing, Orthogonal Frequency Division Multiplexing, Space Division Multiplexing



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Department of Information Technology

6. Text Books:

1. A. V. Oppenheim, A. S. Willsky and S. H. Nawab, "Signals and Systems", 2nd Edition
2. William Sinnema and Tom McGavern, "Digital, Analogue and Data Communication", Prentice Hall.
3. Proakis, John, and Masoud Salehi. Communication Systems Engineering. 2nd ed. Upper Saddle River, NJ: Prentice Hall, 2001. ISBN: 9780130617934.

7. References:

1. B. P. Lathi et. al., Modern Digital and Analog Communication Systems 4E, Oxford Publication.
2. Haykin, Simon. Communication Systems. 5th ed. New York, NY: Wiley, 2009. ISBN: 9780470169964.



Indian Institute of Information Technology - Allahabad

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Department of Information Technology

Subject Name	Web Development		
Subject Code		Credits	2
Scheme (L-T-P)	0-0-4	Instruction	0 Hours/week (L) 4 Hours/week (P)
Course Objectives	<ul style="list-style-type: none"> To make students aware about the latest technologies in Web development. To give hands-on exposure to students on web development technologies. This course will be short but covering a wide variety of topics related to web development. 		
Course Outcomes	<ul style="list-style-type: none"> Students will have a basic understanding of modern web development tools and techniques 		
Unit	Content		Hours (Lab)
1.	Introduction to Web Development, Overview of web technologies, Client-side vs. server-side development, Web development tools and environments, HTML (Hypertext Markup Language), Basic HTML structure and syntax, Working with text, links, images, and tables, Semantic HTML and accessibility, HTML forms and input validation, multi page websites. CSS (Cascading Style Sheets), Introduction to CSS and its role in web design, CSS selectors, properties, and values, Layout and positioning of HTML elements, Responsive design and media queries,		14
2.	JavaScript, Introduction to JavaScript and its role in web development, JavaScript syntax, variables, and data types, Control structures (loops, conditionals), DOM manipulation and event handling, Introduction to JavaScript frameworks/libraries (e.g., jQuery), Backend Development, Introduction to server-side programming, Introduction to a server-side language (e.g., PHP, Python, Node.js), Handling HTTP requests and responses, Working with databases (e.g., MySQL, MongoDB), Server-side scripting and data processing,		14
3.	Web Application Frameworks, Introduction to web application frameworks (e.g., Ruby on Rails, Django), MVC (Model-View-Controller) architecture, Routing, templates, and database integration in a framework, Frontend Frameworks and Libraries, Introduction to frontend frameworks (e.g., React, Angular, Vue.js), Component-based development, State management and data binding,		14
4.	Web Security, Common web vulnerabilities (e.g., XSS, CSRF), Best practices for secure web development, User authentication and authorization, Web Performance Optimization, Techniques for improving website performance, Minification and compression of web assets, Caching and CDN (Content Delivery Network) integration, Web Deployment and Hosting, Setting up a web server, Deploying web applications to a hosting platform, Continuous integration and deployment		14

Text Book [TB]

1. HTML and CSS: Design and Build Websites by Jon Duckett, Wiley
2. JavaScript and jQuery by Jon Duckett, Wiley

Reference Book [RB]

1. The Web Developer Bootcamp" by Colt Steele
(<https://www.udemy.com/course/the-web-developer-bootcamp/>)
2. Modern JavaScript From The Beginning 2.0 - 2023 Revamp
(<https://www.udemy.com/course/modern-javascript-from-the-beginning/>)



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3. The Complete Web Developer Course 3.0
(<https://www.udemy.com/course/the-complete-web-developer-course-2/>)
4. Web Design for Everybody: Basics of Web Development & Coding by University of Michigan,
(<https://www.coursera.org/specializations/web-design>)
5. LinkedIn Learning (www.linkedin.com/learning),
6. · Become a Web Developer learning path
7. · Front-End Web Development learning path
8. · Full-Stack Web Development learning path



Indian Institute of Information Technology - Allahabad

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Department of Information Technology

NEP-2020 Based B.Tech.-Business Informatics- UG curriculum

(With effect from **July 2023**)*

Total Credit : 160

NEP-2020- New Education Policy- 2020

L-T-P (hr)

Lecture-L: 1 Credit = 1 hr/ week

Tutorial-T: 1 Credit = 1hr/week

Practical-P: 1 credit = 2 hr/week

*B.Tech.(IT-Business Informatics) to be valid for the Batch 2023-24 only.

Multidisciplinary Engineering Program: Sem-wise Credit Dist.- One Major, One Minor

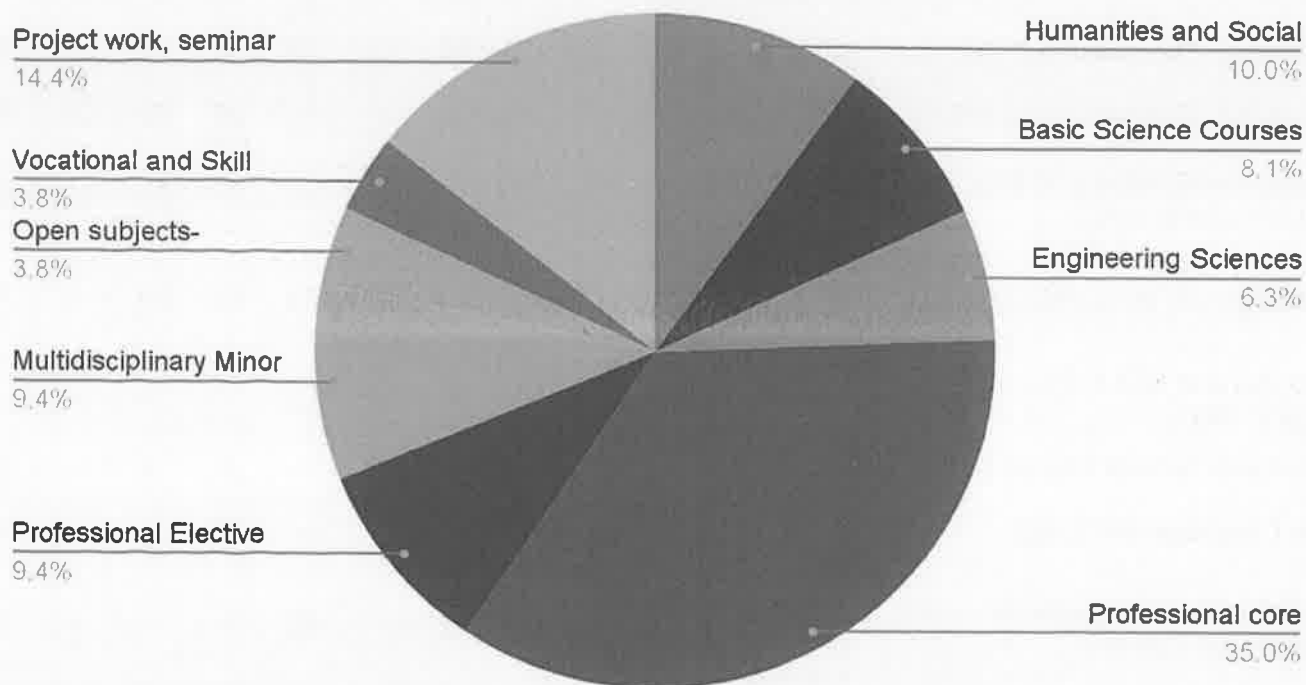
Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science Course	BSC/ESC	08	--	03	--	--	02	--	--	13
Engineering Science Course		07	03		--	--	--	--	--	10
Programme Core Course (PCC)	Programme Courses	--	12	14	18	13	03	00	--	60
Programme Elective Course (PEC)		--	--	--	--	--	06	06	03	15
Open/School Elective (OE/SE) other than particular program	Multi-disciplinary	--	--	--	--	--	--	03	03	06
Multidisciplinary Minor (MD M)		--	--	03	03	03	03	03	--	15
Vocational and Skill Enhancement Course (VSEC)	Skill Courses	02	02	--	--	02		--	--	06
Ability Enhancement Course (AEC-01)	Humanities Social Science and Management	02	--	--	--	--	--	--	--	02
Indian Language (AEC-02)		--	--	--	--	--	02	--	--	02
Entrepreneurship/Economics/ Management Courses		--	02	02	--	02	--	--	--	06
Indian Knowledge System (IKS)		--	--	--	--	--	--	02	--	02
Value Education Course (VEC)		01	01	--	--	--	--	--	--	02
Research Methodology (RM)	RM	--	--	--	--	02	--	--	--	02
Internship	Experiential	--	--	--	--	--	--	03	06	17



Indian Institute of Information Technology - Allahabad
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 Department of Information Technology

Project	Learning Courses	--	--	--	--	--	04	04		
Community Engagement Activity (CEA)/Field Project		--	--	02	--	--	--	--	--	02
Co-curricular & Extracurricular Activities (CCA)	Liberal Learning Course	--	--	--	--	--	--	--	--	0
Total Credits (One Major, One Minor degree)		20	20	24	21	22	20	21	12	160

Credit Distribution





Indian Institute of Information Technology - Allahabad

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Department of Information Technology

Curriculum

Semester 1 Total Credit : 20					
Sl.No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Engineering Physics	BS-AS-EGP102	BSC	4	3-0-2-0
2	Linear Algebra	BS-AS-LAL101	BSC	4	3-1-0-0
3	Problem Solving with Programming	ES-IT-PSP101	ESC/VSEC	5 (3/2)	3-0-4-0
4	Fundamentals of Electrical & Electronics Engg.	ES-EC-FEE101	ESC	4	3-0-2-0
5	Technical Communication Skill	HM-MS-TCS101	HSMC (AEC)	2	1-0-2-0
6	Constitution of Indian	HM-XX-COI107	HSMC (AEC)	1	1-0-0-0
					14-1-10-0
Total				20	25

Semester 2 Total Credit : 20					
Sl.No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Discrete Mathematical Structures	PC-IT-DMS101	PCC	4	3-1-0-0
2	Computer Organization and Architecture	PC-IT-COA102	PCC	4	3-0-2-0
3	Data Structures and Algorithms	PC-IT-DSA103	PCC	4	3-0-2-0
4	Web Development	VS-IT-WEB101	VSEC	2	0-0-4-0
5	Essentials of Business Informatics	PC-BI-EBI101	PCC	3	3-0-0-0
6	Principles of Management	HM-MS-POM102	HSMC (AEC)	2	1-0-2-0
7	Environmental Studies	HM-XX-EMS105	HSMC (VEC)	1	1-0-0-0
					14-1-10-0
Total				20	26

Exit: After successful completion of one year (first two semesters), a student may get an exit option as per ordinance. They need to do **Skill based courses of 6 credits additional**, in summer, offline before exit. Department will provide a list of such courses.



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Semester 3 Total Credit : 24					
Sl.No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Probability and Statistics	BS-AS-PNS201	BSC	3	2-1-0-0
2	Object Oriented Methodologies	PC-IT-OOM201	PCC	4	3-0-2-0
3	Foundations of FinTech	PC-BI-FFT201	PCC	3	2-1-1
4	Operating System	PC-IT-OPS203	PCC	4	3-0-2-0
5	Software Engineering	PC-IT-SOE204	PCC	3	2-0-2-0
6	<i>Multi-Disciplinary Minor-1</i>	MD-xx-XXX201	MDM	3	3-0-0-0
7	Introduction to Finance	HM-MS-POE208 HM-MS-ITF208	HSMC (AEC)	2	2-0-0-0
8	Community Services NCC,NSS,Yoga,Unnat Bharat Abhiyaan- UBA,Ek Bharat Shrestha Bharat, NGO,Prayas,etc.	CE-xx-XXX209	HSMC (AEC)	2	0-0-0-2
					17-1-10-2
Total				24	30

Semester 4 Total Credit : 21					
Sl.No.	Course Name	Code	Type	Credit	Hours
					L-T-P
1	Design and Analysis of Algorithms	PC-IT-DAA205	PCC	4	3-0-2
2	Operations Research	PC-BI-PPL206	PCC	3	3-0-0
3	Computer Networks	PC-IT-CNE207	PCC	4	3-0-2
4	Digital Marketing	PC-BI-DM201	PCC	3	2-0-2
5	Database Management System	PC-IT-DMS209	PCC	4	3-0-2
6	<i>Multi-Disciplinary Minor-2</i>	MD-xx-XXX202	MDM	3	3-0-0
					17-0-8
Total				21+3	25

Exit: After successful completion of 4 semesters, a student may get an exit option as per ordinance. They need to do **Skill Based Courses of 6 credits, additional**, in summer, before exit. Department will provide a list of such courses.



Indian Institute of Information Technology - Allahabad

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Department of Information Technology

Semester 5 Total Credit : 22						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P-S	
1	Cyber Security	PC-IT-CSE301	PCC	4	3-0-2-0	
2	Introduction to Machine Learning	PC-IT-IML302	PCC	4	3-0-2-0	
3	Business Process Management	PC-BI-BPM202	PCC	4	3-0-2-0	
4	Artificial Intelligence	PC-IT-AIN304	PCC	3	3-0-0-0	
6	Project – I (Research Methodology)	PC-IT-PRO351	PCC	2	0-0-4-0	
7	<i>Multi-Disciplinary Minor-3</i>	MD-xx-XXX203	MDM	3	3-0-0-0	
8	<i>Design Thinking and innovation</i>	HM-MS-DT306	HSMC (AEC)	2	1-0-2-0	
Total					21	15-0-12-0 28

Semester 6 Total Credit : 20						
Sl.No.	Course Name	Code	Type	Credit	Hours	
					L-T-P	
1	Data Analytics	PC-IT-IML302	PCC	3	2-0-2-0	
2	Project – II	PC-IT-PRJ352	PCC	4	0-0-8-0	
3	Biology for Engineers	BS-AS-BFE301	BSC	2	2-0-0-0	
4	Process Mining & Analytics	PC-BI-PM603	PCC	3	2-0-1-0	
5	BI-Elective-1	PE-BI-XXX401	PEC	3	3-0-0-0	
	BI-Elective-Basket: • Details appended					
6	<i>Multi-Disciplinary Minor-4</i>	MD-xx-XXX204	MDM	3	3-0-0-0	
7	Indian/Foreign Language (Regional Language, Sanskrit, German, Japanese, French)	HM-xx-XXX304	HSMC (AEC)	2	1-0-2-0	
Total					20	14-0-12-0 26

Exit: After successful completion of 6 semesters, a student may get an exit option as per ordinance after completion of the summer semester internship (3 credits) and additional 3 credit courses in summer.

Summer Semester Total Credit : 3					
S.N.	Course Name	Code	Type	Credit	
1	Internship	PC-IT-ITP353	ELC	3	Credit will be added in VII Sem.

Note: Internship will be evaluated in the beginning of seventh semester. Its credit and grades will be reflected in 7th semester Grade sheet.



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Semester 7 Total Credit : 21					
Sl.No.	Course Name	Code	Type	Credit	Hours
					L-T-P-S
1	Minor Project	PCITPRJ451	PCC	4	0-0-8-0
2	Big Data Analytics	PEBIXXX403	PCC	3	2-0-2-0
3.	Elective-3 BI-Elective II: IT Project Management + IT Electives	PEITXXX404	PCC	3	3-0-0-0
4	Open Elective-1	OEZZXXX4SS	OEC	3	3-0-0-0
5	<i>Multi-Disciplinary Minor-5</i>	MD-xx-XXX205	MDM	3	3-0-0-0
6	a)History of Indian Civilizations, b)Kautiliya's Arthashastra, c)Vedic Mathematics,d) Vedic Corpus ,e) Wisdom from the Ages, f) Panini's Grammar	HM-MS- XXX408	HSMC (IKS)	2	2-0-0-0
7	Internship(Summer Semester)	PC-IT-TO353	ELEC	3	0-0-0-6-0
					14-0-8-6
Total				21	6+22

Semester 8 Total Credit : 12					
Sl.No.	Course Name	Code	Type	Credit	L-T-P(hr)-S
1	Major Project	PC-IT-PRJ452	ELC	6	0-0-12-0 0-0-0-6*
2	Elective-4	PE-IT-XXX402	PEC	3	3-0-0-0 0-0-0-3*
3	Open Elective-2	OE-ZZ-XXX4SS	OEC	3	3-0-0-0 0-0-0-3*
					6-0-12-0
Total				12	18

8th Semester courses may be allowed to join via MOOC/ NPTEL.

BI Elective Basket:

- Digital Payments
- International Business Operations
- Distributed Systems
- Information Systems Audit and compliances
- Social Network Analysis
- Time Series Analysis

Honors



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Department of Information Technology

- “Honors” is an additional credential a student will earn if he/ she opts for the extra 15 credits needed for this in his/ her own discipline. The concerned department specifies the course requirements for earning the Honors.
- BTech- BI- Honors Course: Minimum 8 CGPI and No backlog.
- After 3rd semester, students may choose extra credits for Honors.
- The 8th Semester project must be an academic project. At least one research publication in Tier I/II conferences or in SCI Journals communicated or one patent filed.

**Multidisciplinary Minor
Business Informatics**

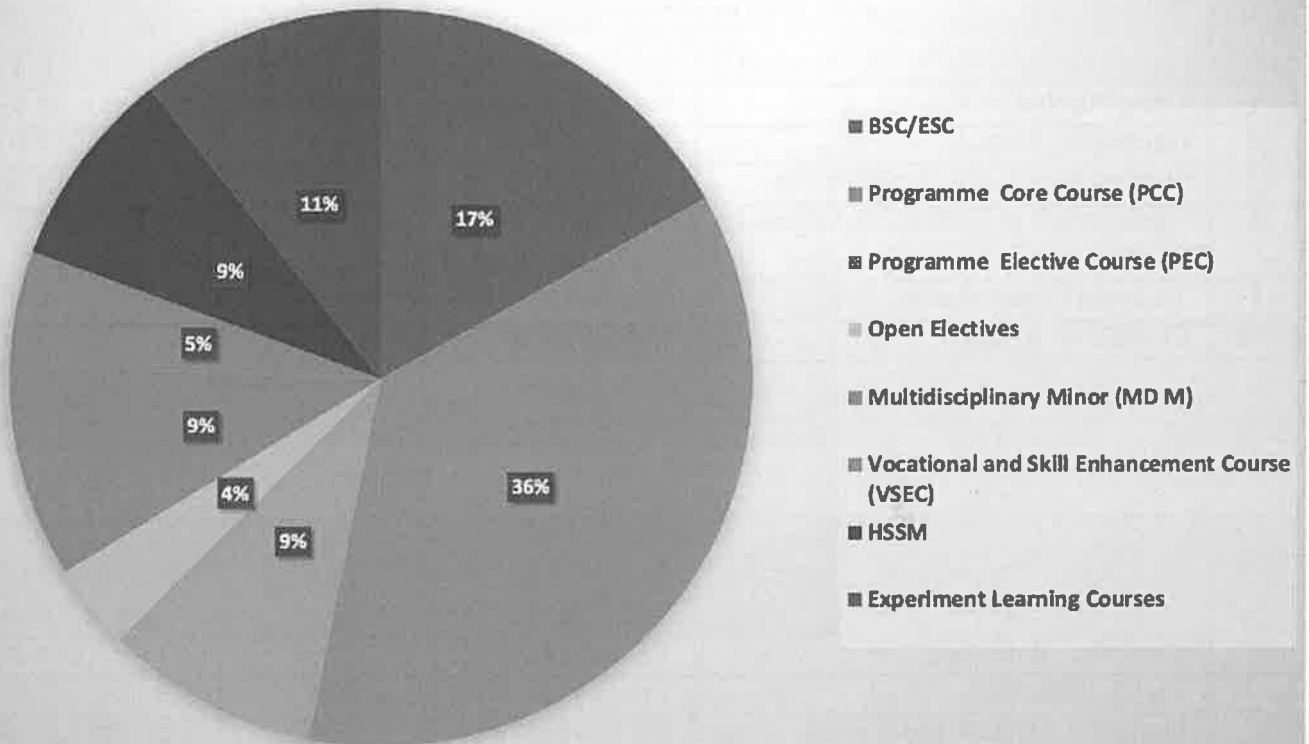
Semester	Course Code	Course Title	Credits	Hours
				L-T-P
III	MDM-01	Business Process Management	3	2-0-2
IV	MDM-02	Digital Marketing	3	2-0-2
V	MDM-03	FinTech	3	2-1-0
VI	MDM-04	Process Mining & Analytics	3	2-0-2
VII	MDM-05	Self-study / Project	3	2-0-2
		Total	15	

Note: Course Coordinator will provide specifics of Minor courses and float other minors also in view of available faculty resources may be allowed to modify the minors as well in the future.



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Department of Electronics and Communication Engineering

NEP-2020 Based B.Tech-ECE UG Curriculum, IITA





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Department of Electronics and Communication Engineering

Curriculum

Semester 1 Total Credit : 20					
Sl.No\	Course Name	Code	Type	Credit	Hours/Week
					L-T-P-S
1	Linear Algebra	BS-AS-LAL101	BSC	4	3-1-0-0
2	Engineering Physics	BS-AS-EGP102	BSC	4	3-0-2-0
3	Problem Solving with Programming	ES-IT-PSP101	ESC/VSEC	5 (3/2)	3-0-4-0
4	Fundamentals of Electrical & Electronics Engineering.	ES-EC-FEE101	ESC	4	3-0-2-0
5	Technical Communication Skills	HM-MS-TCS101	HSMC(AEC)	2	1-0-2-0
6	Constitution of India	HM-xx-HSM107	HSMC(AEC)	1	1-0-0-0
Total				20	14-1-10-0
					25

Semester 2 Total Credit : 20					
Sl.No.	Course Name	Code	Type	Credit	Hours/Week
					L-T-P-S
1	Electronic Workshop	ES-EC-ELW102	VSEC	1	0-0-2-0
2	Digital Electronics	PC-EC-DEL101	PCC	3	2-0-2-0
3	Electronic Devices and Circuits	ES-EC-EDC103	ESC	3	2-0-2-0
4	Electronics Measurements and Instrumentations	PC-EC-EMI103	PCC	3	2-0-2-0
5	Data Structures & Algorithms	EC-IT-DSA103	ESC	4	3-0-2-0
6	Probability and Statistics	BS-AS-PNS201	BSC	3	2-1-0-0
7	Principles of Management	HM-MS-POM102	HSMC(AEC)	2	1-0-2-0
8	Environmental Studies	HM-xx-ENS105	HSMC(VEC)	1	1-0-0-0
Total				20	13-1-12-0
					26

Exit option to qualify for Diploma:

After successful completion of one year (first two semesters), students may get B Tech UG-ECE Certificate. They need to do two courses in summer before exit.

1	Analog Communication	PCECANC204	PCC	3	3-0-0-0
2	Electrical Engineering	PCECELE206	PCC	3	3-0-0-0



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Department of Electronics and Communication Engineering

Semester 3 Total Credit : 23					
SL.No.	Course Name	Code	Type	Credit	Hours/Week
					L-T-P-S
1	Electromagnetic Field and Waves	PC-EC-EFW102	PCC	3	3-0-0-0
2	Analog Communication	PC-EC-ANC204	PCC	4	3-0-2-0
3	Analog Electronics	PC-EC-ANE205	PCC	4	3-0-2-0
4	Microprocessor Interface and Programming	PC-EC-MIP207	PCC	3	2-0-2-0
5	Biology for Engineers	BS-AS-BFE2xx	BSC	2	2-0-0-0
6	<i>Multi-Disciplinary Minor-1</i>	MD-xx-XXX201	MDM	3	3-0-0-0
7	Principles of Economics (50%) Introduction to Finance (50%)	HM-MS-POE208 HM-MS-ITF208	HSMC (AEC)	2	2-0-0-0
8	Community Services NCC, NSS, Yoga, Umat Bharat Abhiyaan-UBA, Ek Bharat Shreshtha Bharat-EBSB, NGO, Prayas, etc.	CE-xx-XXX209	HSMC (CEA)	2	0-0-0-2
Total				23	18-0-6-4
					28

Semester 4 Total Credit : 22					
SL.No.	Course Name	Code	Type	Credit	Hours/Week
					L-T-P-S
1	Control Systems	PC-EC-COS208	PCC	4	3-0-2-0
2	Discrete Time Signal and Systems	PC-EC-DTS209	PCC	3	3-0-0-0
3	Digital IC Design	PC-EC-DID210	PCC	4	3-0-2-0
4	Optical Communication	PC-EC-OPC314	PCC	3	2-0-2-0
5	Antenna and Wave Propagation	PC-EC-AWP212	PCC	4	3-0-2-0
6	SMT Workshop	ES-EC-SMT204	VSEC	1	0-0-2-0
7	<i>Multi-Disciplinary Minor-2</i>	MD-xx-XXX202	MDM	3	3-0-0-0
Total				22	16-0-12-0
					28

Exit option to qualify for Diploma:

After successful completion of 4 semesters, students may get an exit option with UG- Diploma Certificate. They need to do two courses before exit.

1	Embedded System Design	PC-EC-ESD317	PCC	3	2-0-2-0
2	Principles of Wireless Communication	PC-EC-PWC318	PCC	3	2-0-2-0



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Department of Electronics and Communication Engineering

Semester 5 Total Credit : 21					
Sl.No.	Course Name	Code	Type	Credit	Hours/Week
					L-T-P-S
1	Digital Signal Processing	PC-EC-DSP313	PCC	4	3-0-2-0
2	Integrated Circuit Technologies	PC-EC-ICT211	PCC	3	3-0-0-0
3	Microwave Engineering	PC-EC-MWE315	PCC	3	2-0-2-0
4	Digital Communication	PC-EC-DCO316	PCC	3	3-0-0-0
5	Program Elective-I(ELE/OPS)	PE-xx-OPS3xx	PEC	3	2-0-2-0
6	Multi-Disciplinary Minor-3	MD-xx-XXX303	MDM	3	3-0-0-0
7	Design Thinking and Innovation	HM-MS-DTI306	HSMC (AEC)	2	1-0-2-0
Total				21	17-0-8-0
					25

Semester 6 Total Credit : 19					
Sl.No.	Course Name	Code	Type	Credit	Hours/Week
					L-T-P-S
1	Embedded System Design	PC-EC-ESD317	PCC	3	2-0-2-0
2	Mobile and Wireless Communication	PC-EC-MWC318	PCC	4	3-0-2-0
3	Program Elective-II(CNE)	PE-EC-xxx301	PEC	3	2-0-2-0
4	Project	PP-EC-PRJ301	VSEC	4	0-0-8-0
5	Multi-Disciplinary Minor-4	MD-xx-XXX304	MDM	3	3-0-0-0
6	Indian/Foreign Language Regional Language, Sanskrit, German, Japanese, French	HM-xx-XXX304	HSMC (AEC)	2	1-0-2-0
Total				19	11-0-16-0
					27

Exit option to qualify for BSc. (Engineering) Degree:

After successful completion of 6 semesters, students may get an exit option with B Sc (Engineering) Degree.

They need to do two courses before exit.

1	Skill based Elective -1		PCC	3	2-0-2
2	Skill based Elective -II		PCC	3	2-0-2



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SLNo.	Course Name	Code	Type	Credit	
1	Internship	PC-EC-ITP353	ELC	3	<i>Credit will be added in VII Sem.</i>

Note: Internship will be evaluated in the beginning of seventh semester. Its credit and grades will be reflected in 7th semester Grade sheet

Semester 7 Total Credit : 21					
SLNo.	Course Name	Code	Type	Credit	Hours/wWeek
					L-T-P-S
1	Program Elective-III	PE-EC-xxx403	PEC	3	3-0-0-0
2	Program Elective-IV	PE-EC-xxx404	PEC	3	3-0-0-0
3	Open Elective-I	OE-xx-xxx4xx	OEC	3	3-0-0-0
5	<i>Multi-Disciplinary Minor-5</i>	MD-xx-XXX405	MDM	3	3-0-0-0
6	<i>a) History of Indian Civilizations, b) Kautilya's Arthashastra, c) Vedic Mathematics, d) Vedic Corpus, e) Wisdom from the Ages, f) Panini's Grammar</i>	HM-MS-XXX408	HSMC (IKS)	2	2-0-0-0
7	Internship (Summer Semester)	PC-EC-ITP353	ELC	3	0-0-0-6
Total				21	14-0-8-6
					22+6

Semester 8 Total Credit : 14					
SLNo.	Course Name	Code	Type	Credit	Hours/Week
					L-T-P-S
1	Major Project	PP-EC-PRJ403	ELC	8	0-0-16-0
2	Program Elective-V	PE-EC-xxx405	PEC	3	0-0-0-3
3	Open Elective-II	OE-xx-xxx4xx	OEC	3	0-0-0-3
Total				14	0-0-16-6
					22

8th Semester courses may be allowed to join via MOOC/ NPTEL.



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Honors

- Honors is an additional credential, a student will earn if he/ she opts for the extra 15 credits needed for this in his/ her own discipline. The concerned department specifies the course requirements for earning the Honors.
- BTech- ECE- Honor Course: Minimum 8 CGPI and No backlog.
- After 3rd semester, students may choose extra credits for Honors.
- The 8th Semester project must be an academic project. At least one research publication in Tier I/II conferences or in SCI Journals communicated or one patent filed.



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Multidisciplinary Minor-1 Intelligent Communications for 6G

Sl.No.	Course Name	Course Code	Semester	Credits	Hours/Week
					L-T-P
1			III		
2			IV		
3			V		
4			VI		
5			VII		
Total				15	

Multidisciplinary Minor-2 Embedded Systems

Sl.No.	Course Name	Course Code	Semester	Credits	Hours/Week
					L-T-P
1			III		
2			IV		
3			V		
4			VI		
5			VII		
Total				15	

Note: Department will float other minors in future.



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NEP Compliant Curriculum: HSM Courses to be included in UG Programs

Semester	Course category	Course Title	L-T-P-S	Credits	Course sub-category (*)
I	HSMC-01	Technical Communication Skills	1-0-2-0	02	AEC
I	HSMC-02	Constitution of India	1-0-0-0	01	VEC
II	HSMC-03	Principles of Management	2-0-0-0	02	--
II	HSMC-04	Environmental Studies	1-0-0-0	01	VEC
III	HSMC-05	Principles of Economics/Introduction to Finance	2-0-0-0	02	
III	HSMC-06	Active Participation in One of the following: NCC, NSS, Yoga, Unnat Bharat Abhiyaan-UBA, Ek Bharat Shreshtha Bharat-EBSB, NGO, etc.	0-0-0-2	02	CEA
V	HSMC-07	Design Thinking and Innovation	2-0-0-0	02	--
VI	HSMC-08	Indian/Foreign Language (One of the Following) Regional Language/German/Japanese	2-0-0-0	02	AEC
VII	HSMC-09	(One of the following) a) <i>History of Indian Civilizations</i> b) <i>Kautilya's Arthashastra</i> c) <i>Vedic Mathematics</i> d) <i>Vedic Corpus</i> e) <i>Wisdom from the Ages</i> f) <i>Panini's Grammar</i>	2-0-0-0	02	IKS
Total:			13-0-2-2	16	

- **AEC: Ability Enhancement Course**
- **IKS: Indian Knowledge System**
- **VEC: Value Education Course**
- **CEA: Community Engagement Activity**



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Syllabus Ist Year Courses



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Department of Electronics and Communication Engineering

Subject Name	Linear Algebra		
Course Type (Core/Elective)	Core		
Subject Code	BS-AS-LAL101	Credits	4
Scheme (L-T-P)	3-1-0	Instruction	3 Hours/week (L) 1 Hours/week (T)
Course Objectives	Solving systems of linear equations, understanding vector spaces, linear transformations, eigenvalue, eigenvector, generalized notion of angle, distance, and length, diagonalization and orthogonalization, finding least square solutions and singular value decomposition		
Course Outcomes	To be able to solve systems of linear equations, work within vector spaces, to manipulate matrices and to do matrix algebra		

Course Plan:

Unit	Topics for Coverage
Unit 1	System of linear equation, Gauss elimination method, Elementary matrices, Invertible matrices, Gauss-Jordan method for finding inverse of a matrix, Determinant, Cramer's rule, Vector spaces, Linearly independence and dependence, Basis, Dimension.
Unit 2	Linear transformation, Representation of linear maps by matrices, Rank-Nullity theorem, Rank of a matrix, Row and column spaces, Solution space of a system of homogeneous and non-homogeneous equations, Inner product space, Cauchy-Schwarz inequality, Orthogonal basis.
Unit 3	Gram-Schmidt orthogonalization process, Orthogonal projection, Eigenvalue, eigenvector, Cayley-Hamilton theorem, Diagonalizability and minimal polynomial, Spectral theorem.
Unit 4	Positive, negative and semi definite matrices. Decomposition of the matrix in terms of projections, Strategy for choosing the basis for the four fundamental subspaces, Least square solutions and fittings, Singular value decomposition, Primary decomposition theorem, Jordan canonical form.

1. Text Books/References:

1. Gilbert Strang, Introduction to Linear Algebra, 4th Edition, Cambridge Press (2009).
2. K. Hoffman and R. Kunze, Linear Algebra, 2nd Edition, Pearson (2015).
3. S. Kumaresan, Linear algebra - A Geometric approach, Prentice Hall of India (2000).
4. S. Lang, Introduction to Linear Algebra, 2nd Edition, Springer (2012).



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Subject Name	Engineering Physics		
Course Type (Core/Elective)	Core		
Subject Code	BS-AS-EGP102	Credits	4
Scheme (L-T-P)	3-0-2	Instruction	3 Hours/week (L) 2 Hours/week (P)

1. Objective of the course:

- Demonstrate ability to collect, process, and analyze scientific data. Display critical thinking skills in applying physics knowledge in the experimental process.
- To impart knowledge in basic concepts of physics relevant to engineering applications.
- To introduce advances in technology for engineering applications.

2. Outcome of the course:

- To design and conduct simple experiments as well as analyze and interpret data in engineering applications.
- Capability to understand advanced topics in engineering
- Identify formula and solve engineering problems
- Apply quantum physics to electrical phenomena

3. Course Plan:

Unit	Topics for Coverage
Unit 1	Classical Mechanics: Symmetry and conservation laws, Fermat's principle, Principle of least action, Euler Lagrange equations and its applications, Degrees of freedom, Constraints and constraint forces, Generalized coordinates, Lagrange's equations of motion, Generalized momentum, Ignorable coordinates, Concept of phase space, Hamiltonian, Hamilton's equations of motion and applications.
Unit 2	Quantum Mechanics: De Broglie's hypothesis. Uncertainty Principle, wave function and wave packets, phase and group velocities. Schrödinger Equation. Probabilities and Normalization. Expectation values. Eigenvalues and eigenfunctions. Infinite potential well and energy quantization. Finite square well, potential steps and barriers - notion of tunneling, Electron in periodic potential and band structure of solid.
Unit 3	Solid State Physics: Introduction, Energy Bands in conductors, semiconductors (intrinsic and extrinsic), insulators, Carrier transport in semiconductor (diffusion current, drift current) mobility and resistivity. Generation and recombination of carriers in semiconductors. Donors and acceptors in the band model, electron effective mass, Density of states, Thermal equilibrium, Fermi-Dirac distribution function for electrons and holes, Fermi energy. Equilibrium distribution of electrons & holes. The n-p product and the intrinsic carrier concentration at extremely high and low temperatures, Variation of Fermi energy with doping concentration and temperature. Mechanism of carrier scattering, Einstein relationship between diffusion coefficient and mobility



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6. Text Book:

- **Classical Mechanics:**
- Classical Mechanics; H. Goldstein, C. Poole, J. Safko.
- **Quantum Mechanics:**
- Introduction to Quantum Mechanics by D . J. Griffiths Modern Physics by A. Beiser)
- **Solid State Physics**
- Physics of semiconductor devices, S M Sze, John Wiley & Sons, 2006.;

7. References Books:

- Theoretical Mechanics by M. Spiegel. Feynman Lectures of Physics Vol-1 and Vol-3.
- Quantum Physics for Atoms, Molecules, Solids, Nuclei and Particles by R Eisberg and R. Resnick.
- Modern Semiconductor Devices for Integrated Circuits, Chenming Hu .



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Subject Name	Problem Solving with Programming (PSP)		
Subject Code	ES-IT-PSP101	Credits	5
Scheme (L-T-P)	3-0-4	Instruction	3 Hours/week (L) 4 Hours/week (P)
Course Objectives	<ul style="list-style-type: none"> ● To make students aware of history and advancement in Computer Science. ● To make students aware about the Computers and its related ecosystem. ● To introduce the first programming language (in this case C language) ● To develop a problem solving approach in students with a programmer's perspective. ● To acquaint students with various engineering problems and a beginners approach to solve them 		
Course Outcomes	<ul style="list-style-type: none"> ● Students will be aware of the basic computer science advancements and its history. ● Students will be aware about the common computer science equipment, jargon and ecosystem. ● Students will have a thorough knowledge of the C programming language. ● Students will be able to address a given programming problem in a structured manner similar to industry standards. ● Students will be aware of the latest engineering problems and feel confident in handling them in future. 		
Unit	Content		Hours Lecture (Lab)
1	<ul style="list-style-type: none"> ● Introduction to Computers & Demo: History of Computers, Engineering in the 21st Century, Recent Engineering Achievements, Changing Engineering Environment, ● Computer hardware, Memory, CPU, Input/ Output devices, ● Computer Networks, LAN, File Server, WAN, WWW, GUI/CLI, Ethernet, Wi-Fi, Modem, Switches, Routers, IP Address, Proxy, Gateway; ● Operating Systems, Installation/Uninstallation, Disk/Directory/Files system, Application Software; ● Professional Ethics for Computer Programmers 		4 (4) [TB1, TB2-Ch.1]
2	<ul style="list-style-type: none"> ● Introduction to Computer Languages (Machine Language, Assembly Language, High Level languages), History of C, Software Development Life Cycle; Compiling and running a Program on Visual Studio on Windows, GNU gcc on Linux, and in a GCC Docker Container. ● Structure of a simple C program (preprocessor directive, #include and #define directives, header files and library files) Debugging, Testing and Documentation (compiler error, linker error, and run-time error), ● Constants and Variables, Basic Data Types, Assignment Statements, Arithmetic Operators, Constants/ Literals, Expressions, Statements and Comments. ● Standard Input and Output, Mathematical Functions, Character Functions, Character I/O, Character Comparisons. 		8 (10) [TB1-Ch1, Ch.2, Ch.3] [TB2-Ch. 2, 9]
3	<ul style="list-style-type: none"> ● Structured Programming: Problem analysis (requirement analysis, program design), Algorithms Pseudocode and Flowchart, ● Operators (Relational, Logical, Boolean, Ternary, Bitwise, Conditional, Sizeof, Comma), Precedence and Associativity, implicit and explicit type conversion, ● Selection Statements (Simple if, if/else, switch), Loop Structures (while, do/while, for, exit, break and continue) ● Data Files: I/O Statements, Reading data files (Specified Number of Records, Trailer or Sentinel Signals, End-of-File, Generating data files. 		9 (12) [TB1-Ch. 3] [TB2-Ch. 3, 4, 5, 11]
4	<ul style="list-style-type: none"> ● Modular Programming: User defined functions, function definition, prototype, parameter list, Function Arguments and Return Types, Storage class and Scope, Function call, Macros, Nested and Recursive Function 		6 (8) [TB1-Ch. 4, 5] [TB2-Ch. 5, 6]



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	<ul style="list-style-type: none"> ● Array: One Dimensional arrays (Definition and Initialization, Computations and Output, Function Arguments), Passing Arguments by Value, Passing Arguments by Address, Two Dimensional Arrays (Definition and Initialization, Computations and Output, Function Arguments), Higher dimensional Arrays 	
5	<ul style="list-style-type: none"> ● Pointer: Addresses and Pointers, Address Operator, Pointer Assignment, Address Arithmetic, Chain of Pointers, Pointers to Array Elements: 1-D Arrays, 2-D Arrays. Array of Pointers, Pointers as Function Arguments, Function Returning pointers. ● Character Strings, String Definition and I/O, Null Character, String Library Functions (String length, string copy, string concatenation, string compare), Pointers and Strings. 	9 (12) [TB1-Ch.6] [TB2-Ch. 7, 8]
6	<ul style="list-style-type: none"> ● Dynamic Memory Allocation (calloc(), malloc(), realloc(), free()) ● Structures: Definition and Initialization, Input and Output, Structures as Function Arguments, Functions returning Structures, Array of Structures, passing array of structure to function, Nested Structures, Unions ● Bitwise operators, Bit fields, Enumeration ● Pointer to Structure, Dynamic Data Structure: Linked List, Stack, Queue. 	6 (10) [TB1-Ch.7] [TB2-Ch. 10, 12]
Text Book [TB]		
1	Engineering Problem Solving with C, 4th Ed. (2016) by Delores M. Etter, Pearson	
2	C: How to Program, 9th Edition (2023) by Paul Deitel and Harvey Deitel, Pearson	
Reference Book [RB]		
1	Computer Systems: A Programmer's Perspective, 3rd Edition by Randal E Bryant and David R O'Hallaron, Pearson	
2	Problem Solving and Program Design in C, 8th Global Edition. by Jeri R. Hanly and Elliot B. Koffman, Pearson	
3	Programming in C, Brian Kernighan and Dennis Ritchie	



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Subject Name	Fundamentals of Electrical and Electronics Engineering		
Course Type (Core/Elective)	Core		
Subject Code	ES-EC-FEE101	Credits	4
Scheme (L-T-P)	2-0-2	Instruction	2 Hours/week (L) 2 Hours/week (P)

1. Name of the Course: Fundamentals of Electrical and Electronics Engineering

2. LTP structure of the course: 3:0:2 (Hours per Week)

3. Objective of the course: This course is intended to be the text for a first course in electrical and electronics engineering. It is partitioned into four parts electrical circuits, electro-mechanics, semiconductor, devices, and electronics circuits.

4. Outcome of the course: To provide an overall introduction and working principles of basic electrical and electronic devices and circuits.

5. Course Plan: As per the below format only

Unit	Topics for Coverage
Unit 1	Introduction, basic physical laws, circuit elements, KVL, KCL, Network Theorems
Unit 2	Transients in R-L, R-C, R-L-C, Sinusoidal Steady State, Real/Reactive Power, Three Phase Working Principles of Transformers/AC/DC machines
Unit 3	Semiconductors, Band Diagram, n-type and p-type semiconductor, junction diode, diode biasing, Zener diode, DC Power supply
Unit 4	Introduction to Bipolar Junction Transistor, MOS Capacitor, Introduction to Operational Amplifier, Schmitt Trigger, Multivibrator, Oscillators

6. Text Book:

1. Microelectronic Circuits SEDRA/SMITH 7th Edition Oxford University Press
2. Fundamentals of Electrical Engineering, Leonard S Bobrow, 2nd Edition, Oxford Press.
3. Fundamentals of Electrical Engineering and Electronics, B L Thereja, S Chand Press.

7. References:

1. Network Analysis, M E van Valkenberg, 3rd Edition, PHI, 2000
2. Linear Circuit Analysis: Time, Domain, Phasor and Laplace Transform Approaches, R A DeCarlo and M Lin, 2nd Edition, Oxford University Press, 2000



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Technical Communication Skills

B. TECH IST SEMESTER (IT, EC AND OTHER INTEGRATED COURSES)

Subject Name	Technical Communication Skills		
Course Type (Core/Elective)	Core		
Subject Code	HM-MS-TCS101	Credits	2
Scheme (L-T-P)	1-0-2	Instruction	1 Hours/week (L) 2 Hours/week (T)
Course Objectives	The course is designed to enhance and polish communication skills of undergraduate students which will formally help them to be effective professionals by understanding importance of effective communication, presentation and designing of work. The focus of the course is to engage and involve students with hands on situation and solve problems on regular basis so that they learn the basics of Academic writing & Technical aspects of communication		
Course Outcomes	The course is designed to enhance and polish communication skills of undergraduate students which will formally help them to be effective professionals by understanding importance of effective communication, presentation and designing of work.		

UNITS TO BE TAUGHT:

Introduction to types of communication
Lab sessions and mock presentation pertaining to
Communication Styles
Content Management and Delivery
Making Effective Public presentations
Speech and diction correction and counseling

Formal communication

Written communication, Problems and solutions Lab sessions will have exposure to:

Cover letter
CV preparation
Group discussion and
Personal interview
Report writing and
Proposal development (Product development plan)

Interview types and techniques

The session would be based on
Role play
Moderation and intervention techniques
SWOT Analysis

SUGGESTIVE READINGS:

Reference Books:
Winning at Interviews by Edgar Thorpe
Books on Technical Writing

No text Books are prescribed as this paper requires Practical approach rather than Theoretical reading.



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However, students can always refer to the books available in Library for better understanding of the Lab sessions.

LTP STRUCTURE

Introduction to types of communication

Lab sessions and mock presentation pertaining to

Communication Styles (2 L, 2T, 1P)

Content Management and Delivery (PPT) (1 T)

Making Effective Public presentations (1T, 1 P)

Speech and diction correction and counseling (1T, 1 P)

Formal communication

Written communication, Problems and solutions Lab sessions will have exposure to:

Cover letter (1T, 1P)

CV preparation (2T, 2 P)

Group discussion and (2 P)

Personal interview (1P)

Report writing and (1T, 1P)

Proposal development (Product development plan) (1 T, 1P)

Interview types and techniques (1 T)

The session would be based on

Role play (1P)

Moderation and intervention techniques (1T, 1P)

SWOT Analysis (1T, 1 P)



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Subject Name	Digital Electronics		
Course Type (Core/Elective)	Core		
Subject Code	PC-EC-DEL101	Credits	4
Scheme (L-T-P)	2-0-2	Instruction	2 Hours/week (L) 2 Hours/week (P)

Objective of the course: The objective of this course is to familiarize the students with the design of digital systems using Verilog HDL

Outcome of the course: After completion of this course, students will be having strong skill set of Verilog HDL, writing Test bench and implementing any digital system on FPGA.

Course Plan: As per the below format only

Unit	Topics for Coverage
Unit 1	Introduction to Digital Electronics: Number System, $r-1$'s complement, Sign and Magnitude Numbers, r 's Complement Numbers, Gray Code, Boolean Algebra & logic minimization, k-map, Logic Family (BJT and CMOS based), Data-flow description using Verilog
Unit 2	Combinational Logic Design: arithmetic circuit design, Design using MSI components; Multiplexers and De-multiplexers, Encoder, Decoder Binary Adders, Subtraction and Multiplication. Structural design and implementation using Verilog HDL
Unit 3	Sequential Network: Concepts of Sequential Networks, State Diagram, Latches and Flip Flops, Counters and Shift Registers, state machine, Finite state machine; HDL Implementation of Digital circuits, Behavioral description of sequential circuits using HDL
Unit 4	Memory Elements and Arrays Registers, RAM and ROMs, programmable logic array, Memories. Field Programmable Gate Array (FPGA), LUT, Slices, Semi-custom and Full custom design, Implementation of the digital system on FPGA

6. Text Book:

M. Morris Mano, Michael D. Ciletti, "Digital Design with an Introduction to the Verilog HDL", 5th Edition, Pearson Education Inc

7. References Books:

1. Samir Palnitkar, "Verilog HDL: A Guide to Digital Design and Synthesis", Second Edition, Prentice Hall
2. Computer Arithmetic Algorithms, 2nd Edition by Israel Koren



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Subject Name	Electronic Devices and Circuits		
Course Type (Core/Elective)	Core		
Subject Code	ES-EC-EDC103	Credits	4
Scheme (L-T-P)	2-0-2	Instruction	2 Hours/week (L) 2 Hours/week (P)

Objective of the course: This course is designed for the students seeking an extensive understanding of electronic devices and circuits and problem solving techniques. Being a freshman and a core course in electronics engineering, the lucidity is maintained throughout. It is partitioned into four parts semiconductor diodes, bipolar junction transistors, MOSFET and their small signal analysis.

Outcome of the course: After completion of this course, the student will be independent to drill any real world problems in this subject and appear in any challenging competitive exams

Course Plan: As per the below format only

Unit	Topics for Coverage
Unit 1	Semiconductor Diodes & Circuits: Physical operation of p-n junction diodes, Light emitting diodes, photo diode, circuits
Unit 2	Small Signal and Large Signal Analysis of BJTs: Small & Large Signal Analysis of CE, CB, CC Multistage Amp.
Unit 3	MOSFETs: Energy band diagrams, Flat-band pinch-off voltage, JFET, Complementary MOS (CMOS), V-I Characteristics.
Unit 4	Small Signal & Large Signal Analysis of FETs: Small Signal & Large Signal Analysis of CS, CD, Multistage.

Text Book:

A. S. Sedra, K. Carless Smith Microelectronics, , 7th Edition, Oxford University.
Integrated Electronics, J Millman and C Halkias, TMH Press.



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Subject Name	Probability & Statistics		
Course Type (Core/Elective)	Core		
Subject Code	BS-AS-PAS03	Credits	4
Scheme (L-T-P)	2-1-0	Instruction	2 Hours/week (L) 1 Hours/week (T)

Name of the Course: Probability & Statistics

LTP structure of the course: 2-1-0

Objective of the course: This course provides an elementary introduction to probability and statistics with applications. The topics covered in this course are basic concept of probability and statistics, random variables, probability distributions, Bayesian inference, joint probability distributions, random vectors, central limit theorem, confidence intervals.

Outcome of the course: The topics covered in this course would be very much useful for the B. Tech. to develop basic understanding of the subject. This course would also provide the students the background required to apply the basic concepts of probability and statistics in handling large data, analysing noise in a system and studying stochastic processes.

Course Plan:

Unit	Topics for Coverage
Unit 1	Probability: Axiomatic definition, Properties, Conditional probability, Bayes rule and independence of events, Random Variables, Distribution function.
Unit 2	Linear transformation, Representation of linear maps by matrices, Rank-Nullity theorem, Rank of a matrix, Row and column spaces, Solution space of a system of homogeneous and non-homogeneous linear equations, Discrete and Continuous random variables, Expectation, Function of random variable, Moments, Moment generating function, Chebyshev's and Markov's inequality. Bernoulli, Binomial, Geometric, Negative binomial, Hypergeometric, Poisson, Discrete uniform, Continuous uniform, Exponential, Gamma, Normal.
Unit 3	Random vector: Joint distributions, Marginal and conditional distributions, Moments, Independence of random variables, Covariance, Correlation, Functions of random variables.
Unit 4	Law of Large Numbers: Weak law of large numbers, Levy's Central limit theorem (independently and identically distributed with finite variance case), Normal and Poisson approximations to Binomial, Statistics: Introduction: Population, Sample, Parameters, Point Estimation: Method of moments, Maximum likelihood estimation, Unbiasedness, Consistency, Interval Estimation: Confidence interval.

Text Book:

1. Sheldon M. Ross, An Introduction to Probability Models, 10th Edition, Academic Press, Elsevier.
2. Sheldon M. Ross, An Introduction to Probability and Statistics for Engineers and Scientists, 3rd Edition, Academic Press, Elsevier.

References Books:

1. Rohatgi, V. K. and Saleh, A. K. (2000), *An Introduction to Probability and Statistics*, 2nd Edition, Wiley-interscience.
2. Bertsekas, D. P. and Tsitsiklis, J. N. (2008), *Introduction to Probability*, Athena Scientific, Massachusetts.
3. Montgomery, D. C., Peck, E. A. and Vining, G. G. (2012), *An Introduction to Linear Regression Analysis*, 5th Edition, Wiley.



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Subject Name	Data Structures and Algorithms		
Course Type (Core/Elective)	Core		
Subject Code		Credits	4
Scheme (L-T-P)	3-0-2	Instruction	3 Hours/week (L) 2 Hours/week (P)

Objective of the course: To teach the linear and non-linear structures in which data can be stored and their pros and cons. To appreciate the need and working of different ways of storing data and using them for different applications. To write algorithms that make use of different data structures.

Outcome of the course: The students will learn different structures by which data can be stored, retrieved and modified. This forms the foundations for the course on algorithms and a sound knowledge is used in almost every course and project work prescribed by the institute. The course emphasizes on lab work wherein the students learn not only to make different data structures and algorithms, but also their application in different synthetic problems.

Course Plan:

Unit	Topics for Coverage
Unit 1	Introduction, Complexity Analysis, Recursion, Searching, Sorting
Unit 2	Linked List, Abstract Data Types, Stacks and Queues
Unit 3	Trees, Traversal, Binary Search Tree, Height Balanced Tree (AVL Tree), Heap, Priority Queue, Heap Sort, Hashing, Dictionaries.
Unit 4	Graphs, Graph Representation, Graph Traversal - DFS, BFS, Minimum Spanning Tree - Prim's and Kruskal's, Single Source Shortest Path - Dijkstra; Geometric data structures.

1. Text Book:

- E. Horowitz, S. Sahni, S. Anderson-Freed, Fundamentals of Data Structures in C, Second Edition, 2008.
- Y. Langsam, M. J. Augenstein, A. M. Tenenbaum, Data Structures Using C and C++, PHI, New Delhi, 2001.
- Data Structures and Algorithm Analysis in C (DSAC) by Mark Allen Weiss, Second Edition, 2002

2. References:

- Algorithms Design by Jon Kleinberg and Eva Tardos, Pearson, 2013
- The C Programming Language by Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall
- T. H. Cormen, C.E. Leiserson, R.L. Rivest, C. Stein, Introduction to Algorithms 3rd ed., PHI, New Delhi, 2009.



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Subject Name	Electronics Measurements and Instrumentations		
Course Type (Core/Elective)	Core		
Subject Code	PC-EC-EMI103	Credits	3
Scheme (L-T-P)	2-0-2	Instruction	2 Hours/week (L) 2 Hours/week (P)

Objective of the course: To introduce them to the basics of measuring instruments. To make them aware of working and practical application of instruments. They will be exposed to sensors.

Outcome of the course: They will be able to understand the working principle of various instruments. That will help to make better use of measuring instruments. They will be able to use different kind of sensor. How to select a suitable measuring instrument for the any measurement.

Course Plan:

Unit	Topics for Coverage
Unit 1	Static Characteristics and Errors: Measurements, classification of instruments, Static characteristics of measurement instruments, Types of errors, Loading effect.
Unit 2	Electronic Instruments for Measuring Basic Parameters: DC Voltmeters, AC Voltmeters, Ammeters, Shielding & grounding, CTPT. Oscilloscopes: Basic construction, working, Kinds of Oscilloscopes.
Unit 3	Signal Generation and measurement techniques: Sine wave generators, Harmonic distortion analyzer, Spectrum analyzer.
Unit 4	Transducers Classification, Selection Criteria, Characteristics, Construction, Application of following of different transducers.

6. Text Book:

- A.K. Sawhney, PuneetSawhney, A Course In Electrical And Electronic Measurements And Instrumentation, Dhanpat Rai Publications, 2012
- H. S. Kalsi, Electronic Instrumentation, 3 edition, McGraw Hill Education, 2017
- Other references as prescribed by the concerned faculty.