SYLLABI

and

SCHEME OF TEACHING

MASTER OF ENGINEERING

IN

ELECTRONICS & COMMUNICATION ENGINEERING

VLSI (DESIGN)

MODULAR PROGRAMME

(2024 – 2027)

ELECTRONICS & COMMUNICATION ENGINEERING DEPARTMENT

NATIONAL INSTITUTE OF TECHNICAL TEACHERS TRAINING & RESEARCH
(Deemed to be University under Distinct Category)

CHANDIGARH

June 2024

STUDY & EVALUATION SCHEME

SESSION 2024-27

M.E. ELECTRONICS & COMMUNICATION ENGINEERING VLSI (DESIGN)
PROGRAM CODE: NC24S0721M
MODULAR PROGRAMME (Total Hours = 1800)

SUBJECT CODE	SUBJECT	SCHEDULE OF TEACHING (**per 7-days week**)			CREDITS	MARKS		
		L	P	TOTAL		Internal Assessment	End Spell Examination	TOTAL
SPELL - I								
As per subject chosen	Program Core – I	12	-	12	4	50	50	100
As per subject chosen	Program Elective – I	9	-	9	3	50	50	100
As per subject chosen	Program Elective – II	9	-	9	3	50	50	100
#OCA		-	-	12	-	-	-	-
TOTAL				42	**10**	**150**	**150**	**300**
SPELL - II								
As per subject chosen	Program Core – II	12	-	12	4	50	50	100
As per subject chosen	Program Elective – III	9	-	9	3	50	50	100
072171	Research Seminar – I	-	6	6	1	50	-	50
#OCA		-	-	15	-	-	-	-
TOTAL				42	**8**	**150**	**100**	**250**
SPELL - III								
As per subject chosen	Program Core – III	12	-	12	4	50	50	100
As per subject chosen	Program Elective – IV	9	-	9	3	50	50	100
072161	Lab – I	-	18	18	3	50	-	50
#OCA		-	-	3	-	-	-	-
TOTAL				42	**10**	**150**	**100**	**250**
SPELL - IV								
As per subject chosen	Program Core – IV	12	-	12	4	50	50	100
As per subject chosen	Program Core – V	12	-	12	4	50	50	100
072172	Research Seminar – II	-	6	6	1	50	-	50
#OCA		-	-	12	-	-	-	-
TOTAL				42	**9**	**150**	**100**	**250**

SUBJECT CODE	SUBJECT	SCHEDULE OF TEACHING (**per 7-days week**)			CREDITS	MARKS		
		L	P	TOTAL		Internal Assessment	End Spell Examination	TOTAL
SPELL - V								
As per subject chosen	OEC / SEC / AEC – I	9	-	9	3	50	50	100
As per subject chosen	OEC / SEC / AEC – II	9	-	9	3	50	50	100
072162	Lab – II	-	18	18	3	50	-	50
[#]OCA		-	-	6	-	-	-	-
TOTAL				42	**9**	**150**	**100**	**250**
SPELL - VI								
052071	Research Methodology	12	-	12	4	50	50	100
072163	Preliminary Thesis	-	45	45	10	-	-	-
[#]OCA		-	-	3	-	-	-	-
TOTAL				60	**14**	**50**	**50**	**100**
SPELL - VII								
072164	Thesis	-	60	60	20	100*	100	200**
[#]OCA		-	-	30	-	-	-	-
TOTAL				90	**20**	**100**	**100**	**200**

* Internal assessment is based on the following criterion:

Grade	**Condition**
A+	Publication from Thesis in SCI / SCIE indexed journal
A	Publication from Thesis in Scopus / ESCI indexed journal
B+	Publication from Thesis in UGC journal **OR** Scopus indexed conference proceedings
B	Publication from Thesis in International Conference
C+	Publication from Thesis in National Conference

** Final Grade will be average of the grades of internal assessment and university viva-voce examination

 # Out of Class Activities: Preparing Assignments, Seminar preparation, PPT preparation, Literature Survey, Self-Study etc.

PROGRAM TOTAL CREDITS = 80

NOTES: 1. *Requirement for the award of ME Electronics & Communication Department (VLSI Design) degree is 80 credits with minimum CGPA of 6.0*

2. Post-Graduate Diploma in ME Electronics & Communication Department (VLSI Design) will be awarded to those who exit after successful completion of Semester I and II earning 40 credits.

3. The students will study a minimum of 2 and a maximum of 5 SWAYAM-NPTEL self-paced online courses during the program subject to at the most 2 courses in a semester. A 4-weeks duration course will be equivalent to 1 credit course. Any course, except those involving practical component, may be offered in online mode.

4. For SWAYAM-NPTEL courses, the sessional and end-semester examination may be conducted by the institute OR the students may be asked to take the SWAYAM-NPTEL exam by paying the requisite fee and submit the certificate to the department for credit transfer. Grades will be awarded on the basis of marks computed out of 100. In case of reappear in such course, some other course may be repeated with the permission of the Head of the department.

COURSE BASKETS

SPELL - I

One Program Core Course (PCC) from the following list to be studied in the first spell

SUBJECT CODE	SUBJECT	Credits
072101	Semiconductor Devices	4
072102	Analog IC Design	4
072103	Hardware Description Language	4
072104	Digital IC Design	4
072105	System on Chip Design	4

Two Program Elective Courses (PEC) from the following list to be studied in the first spell

SUBJECT CODE	SUBJECT	Credits
072121	AI Applications in VLSI Design	3
072122	VLSI Technology	3
072123	VLSI Testing & Testability	3
072124	Memory Design and Testing	3
072125	Micro & Nanoelectronics Mechanical Systems (MEMS & NEMS)	3
072126	Electronic Manufacturing Technology	3
072127	FPGAs Based System Design	3
072128	Mixed Signal IC Design	3
072129	Digital System Design	3
072130	Microelectronics: Devices to Circuits	3
072131	Mobile and Wireless Communication	3
072132	VLSI Physical Design Automation	3
072133	Internet of Things	3
072134	Computer Architecture and Organization	3
072135	VLSI for Wireless Communication	3
072136	Embedded System Design	3
072137	Information Theory and Coding	3
072138	Antenna Design for Communication and VLSI Systems	3
072139	Next Generation Communication Systems	3
072140	Real Time Digital Signal Processing	3

SPELL – II

One Program Core Course (PCC) from the following list to be studied in the second spell

SUBJECT CODE	SUBJECT	Credits
072101	Semiconductor Devices	4
072102	Analog IC Design	4
072103	Hardware Description Language	4
072104	Digital IC Design	4
072105	System on Chip Design	4

One Program Elective Courses (PEC) from the following list to be studied in the second spell

SUBJECT CODE	SUBJECT	Credits
072121	AI Applications in VLSI Design	3
072122	VLSI Technology	3
072123	VLSI Testing & Testability	3
072124	Memory Design and Testing	3
072125	Micro & Nanoelectronics Mechanical Systems (MEMS & NEMS)	3
072126	Electronic Manufacturing Technology	3
072127	FPGAs Based System Design	3
072128	Mixed Signal IC Design	3
072129	Digital System Design	3
072130	Microelectronics: Devices to Circuits	3
072131	Mobile and Wireless Communication	3
072132	VLSI Physical Design Automation	3
072133	Internet of Things	3
072134	Computer Architecture and Organization	3
072135	VLSI for Wireless Communication	3
072136	Embedded System Design	3
072137	Information Theory and Coding	3
072138	Antenna Design for Communication and VLSI Systems	3
072139	Next Generation Communication Systems	3
072140	Real Time Digital Signal Processing	3

SPELL – III

One Program Core Course (PCC) from the following list to be studied in the third spell

SUBJECT CODE	SUBJECT	Credits
072101	Semiconductor Devices	4
072102	Analog IC Design	4
072103	Hardware Description Language	4

072104	Digital IC Design	4
072105	System on Chip Design	4

<u>One</u> Program Elective Courses (PEC) from the following list to be studied in the first spell

SUBJECT CODE	**SUBJECT**	**Credits**
072121	AI Applications in VLSI Design	3
072122	VLSI Technology	3
072123	VLSI Testing & Testability	3
072124	Memory Design and Testing	3
072125	Micro & Nanoelectronics Mechanical Systems (MEMS & NEMS)	3
072126	Electronic Manufacturing Technology	3
072127	FPGAs Based System Design	3
072128	Mixed Signal IC Design	3
072129	Digital System Design	3
072130	Microelectronics: Devices to Circuits	3
072131	Mobile and Wireless Communication	3
072132	VLSI Physical Design Automation	3
072133	Internet of Things	3
072134	Computer Architecture and Organization	3
072135	VLSI for Wireless Communication	3
072136	Embedded System Design	3
072137	Information Theory and Coding	3
072138	Antenna Design for Communication and VLSI Systems	3
072139	Next Generation Communication Systems	3
072140	Real Time Digital Signal Processing	3

<u>SPELL –IV</u>

<u>Two</u> Program Elective Courses (PEC) from the following list to be studied in the Fourth spell

SUBJECT CODE	**SUBJECT**	**Credits**
072101	Semiconductor Devices	4
072102	Analog IC Design	4
072103	Hardware Description Language	4
072104	Digital IC Design	4
072105	System on Chip Design	4

SPELL – V

A total of Two Courses from the following lists of OEC, SEC & AEC to be studied in the fifth spell.

OPEN ELECTIVE COURSES (OEC)*

SUBJECT CODE	SUBJECT	Credits
072141	System Design For Sustainability	3
072142	Understanding Incubation And Entrepreneurship	3
072143	Fundamentals of Artificial Intelligence	3
072144	Machine Learning And Deep Learning -- Fundamentals And Applications	3
072145	Learning Analytics Tools	3
072146	Data Science	3
072147	Cloud Computing	3
072148	Soft Computing	3
072149	Optimization from Fundamentals	3
072150	Introduction to Industry 4.0 and Industrial Internet of Things	3
072151	Machine Learning for Engineering and Scientific Applications	3

SKILL ENHANCEMENT COURSES (SEC)*

SUBJECT CODE	SUBJECT	CREDITS
072165	Entrepreneurship	3
072166	Patent Law for Engineers and Scientists	3
072167	Advanced Contracts, Tendering and Public Procurement	3
072168	Science Communication: Research Productivity and Data Analytics using Open Source Software	3

ABILITY ENHANCEMENT COURSES (AEC)*

SUBJECT CODE	SUBJECT	CREDITS
072181	Environmental Science	3
072182	Soft Skills	3

*** Any other relevant open elective course in addition to the above listed courses may be added to the list AEC,OEC,SEC & AEC from time to time**

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