Report of

Short Term Course (STC) on

"Nano-electronics & VLSI: Devices, Circuits and Systems"

conducted under

TEQIP-III (Twinning Activities with SLIET Longowal)

1. Name of the Department: Department of Electronics Engineering

2. Title of Short term course: Nanoelectronics & VLSI: Devices, Circuits and Systems

3. Name of Convener: Dr. Pankaj Kumar Pal (NIT Uttarakhand)

Prof. Jagpal Singh Ubhi & Er. Pankaj Kumar Das (SLIET)

4. Name of Coordinator: Dr. Tushar Goel,

Dr. Siva Kumar Tadepalli

Mr. Hemant Kumar Singhal

Ms. Sarita Yadav

5. Duration (Dates): Five (05) days during November 04-08, 2019

6. Day-wise Schedule: Please refer to Annexure-A.

7. Details of Experts/Keynote Speakers:

S.N.	Name of Expert with	Designation	Organization	No. of Lectures Delivered/Hours
1.	Prof. J. S. Ubhi	Professor	SLIET, Longowal	One Hour
2.	Prof. B.K Kaushik	Asso. Professor	IIT, Roorkee	Three Hours
3.	Shri H.S Jattana	Scientist-G and Group-Head, DPG	SCL Chandigarh	Three Hours
4.	Dr. Sanjeev Kumar Gupta	Scientist D and Joint Director	MEITY, GoI, Delhi	Three Hours
5.	Dr. Bishnu Prasad Das	Asst. Professor	IIT, Roorkee	Three Hours
6.	Dr. Ashutosh Nandi	Asst. Professor	NIT, Kurukshetra	Three Hours
7.	Dr. Balraj Singh	Asst. Professor	GBPIET, Pauri	One and Half Hour
8.	Er. Pankaj Kumar Das	Asst. Professor	SLIET, Longowal	One and Half Hour
9.	Dr. Pankaj Kumar Pal	Asst. Professor	NIT, Uttarakhand	Six Hours
10.	Ms. Sarita Yadav	Trainee Teacher	NIT, Uttarakhand	Three Hours

8. Details of Participants:

(a) No. of participants: 25

	Faculty	Research Scholars (PhD and M.Tech)	Industry Participants	Total
External	02	02	00	04
Internal	07	14	00	21

a) List of registered participants: Attached as Annexure-B

b) Photocopy of the daily attendance: Attached as per Annexure-C

9. Registration Fee:

Total registration fee collected from participants: NIL (as all participants are from TEQIP III Institutions)

10. Expenditure Details: (In ₹)

S. No.	Particulars	Approved Expend. (₹)	Actual Expend. (₹)
1.	Honorarium (@ Rs. 5000/- per day for an expert)	75,000/-	50,000/-
2.	Travelling allowances (for external experts)	1,25,000/-	53,513/- + Air Fare of 1 Expert (Claimed by the Experts; Actual may be less after audit from Acc. Section)
3.	Lodging & Fooding for External Experts & Collaborators from SLIET	80,000/-	Arranged by the Institute
4.	Printing materials like Flex, workshop brochure, stationery, certificates & registration materials	20,000/-	11,828/-
5.	Lodging and Fooding (breakfast & dinner only) for external Participants	25,000/-	2,700/- + Bill from Riverside for extra Double occupancy charges
6.	Refreshment (Tea & Snacks) and Lunch during STC	25,000/-	24,000/-
7.	Hired Taxi (for local travel)	15,000/-	- NIL -
8.	Miscellaneous (Flowers Bouquets, Mementos etc.) <i>from Institute Fund</i>	15,000/-	12,328/-
	Grand Total	3,80,000/-	1,54,369/- + Actual bill of Expert Lodging and Air Fares

Note: A sum of Rs. 50,000/- is taken as Advance from Institute Funds for prior-arrangements of STC i.e. reg. materials, banners etc.. In this regard, Rs. 48,303/- was paid and remaining amount of Rs. 1,697/- was submitted to Institute Account (SBI savings acc. No. 37530566069) on 8th Nov. 2019 after the STC. In addition, A reimbursement of Rs. 7,278/- is submitted to account section for the payment done by me on account of Printing materials i.e. banners, flexes, certificates, ID cards etc.

- 11. Outcome of the program on the basis of brainstorming session: After having rigorous brainstorming, it is observed that the STC in question was conducted meticulously for the target group including Faculty, Research Scholars, and PG Students with the achievement of the following aims/objectives:
- ➤ Provided broad exposure to the participants about the various aspects of Nano-electronics & VLSI design from device level to low-power circuits & systems.
- ➤ Enabled the participants in the field of Electronics and Communication Engineering to introspect and learn techniques that help them for active and successful participants in a knowledge society
- ➤ Enhanced the faculty and research scholars' effectiveness in teaching, learning and research in the field of nano-electronics & VLSI design, modeling and simulation of device and circuits.
- ➤ Enriched the knowledge of participants by exposing them to latest trends and dimensions in nano-electronics such as spintronics, GaN and SiC devices.
- ➤ Provided interaction with experts, which helps the participants to initiate their research in recent area in VLSI.

Strengths:

- ➤ Very good, talented, experienced, knowledgeable and well-qualified experts working in different areas of Nano-electronics & VLSI design having in-depth knowledge in the respective field interacted very friendly with the participants.
- > Topics covered and technical talks delivered were very valuable and effective as well as up to the marks. Different applications of same were also discussed.
- ➤ Knowledgeable and effective expert lectures delivered in various fields. STC covered all topic of recent technology and expert lectures were really useful. New knowledge and new skills were imparted and discussion on new ideas and their practical aspects were also provided.
- > Participants were very friendly and cooperative.
- ➤ Hospitality was very good including food quality as well.

> Knowledge provided about the different software(s) was quite useful for the research work.

A few glimpse of Short Term Course on "Nano-electronics and VLSI: Devices, Circuits & Systems" conducted during Nov. $4^{th}-8^{th}$, 2019 at NIT Uttarakhand (Parent campus) are as follows:





































Dr. Pankaj Kumar Pal Convener, STC & Asst. Prof., ECE, NITUK

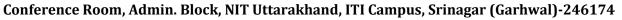


Five Days Short Tem Course

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"Nano-electronics & VLSI: Devices, Circuits and Systems"

(November 04th- 08th, 2019)





Schedule

Data 6 Time	09:30 AM	10:00 AM	11:00 AM	11:15 AM	12:45 PM	02:15 PM	03:45 PM	0	4:00 PM
Date & Time	to 10:00 AM	to 11:00 AM	to 11:15 AM	to 12:45 PM	to 02:15 PM	to 03:45 PM	to 04:00 PM	O	to 5:30 PM
04/11/2019 Monday	Registration & Inauguration	Introduction of STC (JSU)	High-Tea	Intro. to Nanoelectronics (BKK)	Lunch Break	Semiconductor Device Physics & Scaling Chal. (PKP)	Tea & Discussion		Models for Multi- e MOSFETs (AN)
05/11/2019 Tuesday	Spintronics & (BK		Tea & Discussion	GaN Device & Technology (AN)	Lunch Break	Tunnel FETs & Junctionless Devices (BS)	Tea & Discussion	Low-Pov	ver VLSI Circuits (BPD)
06/11/2019 Wednesday	On-Chip Proce (BF		Tea & Discussion	Silicon-on-Insulator Technology (PKP)	Lunch Break	Double gate & FinFETs Technology (PKP)	Tea & Discussion	Circuit S	vice/Mixed-Mode imulations - <i>Lab</i> SY/PKP)
07/11/2019 Thursday	On-chip Int (PK		Tea & Discussion	Semiconductors Memories (PKP)	Lunch Break	VLSI Technology for Device Fabrication (SKG)	Tea & Discussion	using	ircuit Simulation g SPICE - <i>Lab</i> SY/PKP)
08/11/2019 Friday	Silicon Carbide Techn (SF		Tea & Discussion	Analog Design-Front- end (HSJ)	Lunch Break	Challenges & Issues in design of SOCs (HSJ)	Valedicto Certific Distribu	ate	High-Tea

^{*}Tea-Snacks and Lunch will be served outside the Conference Room. Any change in above schedule will be intimated.

JSU - Prof. Jagpal Singh Ubhi, Professor, ECE, SLIET, Longowal

BKK - Dr. Brajesh Kumar Kaushik, Asso. Professor, ECED, IIT Roorkee

BPD - Dr. Bishnu Prasad Das, Asst. Professor, ECED, IIT Roorkee

HSJ - Shri H. S. Jattana Ji, Group Head-DPG, SCL Mohali, Chandigarh

SKG - Dr. Sanjeev Kumar Gupta, Sci. D, Ministry of Electronics & Info. Technology, Delhi

AN - Dr. Ashutosh Nandi, Asst. Professor, ECE, NIT Kurukshetra

BS - Dr. Balraj Singh, Asst. Professor, ECE, GBP IET, Pauri

PKD - Er. Pankaj Kumar Das, Asst. Professor, ECE, SLIET, Longowal

PKP - Dr. Pankaj Kumar Pal, Asst. Professor, ECE, NIT Uttarakhand

SY - Ms. Sarita Yadav, Trainee Teacher, ECE, NIT Uttarakhand

A Short Term Course (STC) on

"Nano-electronics & VLSI: Devices, Circuits & Systems"

November 4th-8th, 2019; Organized at NIT Uttarkhand

Sponsored by:- TEQIP III under twinning activities with SLIET Logowal

Date: 04/11/19

Registration Sheet

S.N.	Name	Designation	Organization	Signature
1	Sumit Kymer	M. TE CH	NTT.UK	Sumit Kumar
2	Albhishek kumas	M-Tech	NITUK	Achistel kumas
3	Dobe Chardra	M-Pech	NIAUK	Ish a chandra
4	Ruchi Juyal	PhD	NITUK	Rings
5	Sund Kr. Manya	m.tech.	NIP UK	er.
6	Ekta Prizadarsh		N27 VK	Skt
<u>7.</u>	Arving 2:34	PhD-scholar	NITUK	(A), J
8	Mairesh R. Siny	PhD. Scholan	MITUR	Menur
9	LALIT GARTA		NET UK	Tall
10	Ser Rajery Kenner	Brogont lock	MITUL	Rayer 1 1
11	Sadin Tiwan	PHO	NITUK	Jan.
12	Varun Gr. Kakar	PhD Scholar	NITUK	19
13	Josui Xillas	14D Schooler	SLIET Loyar	8
14	Mukesh Kuman	PhD Scholar	SLIET LONG	PA
15	Show Tributhi	M, tech schok	MITUK	Bigni
16	Prakan Acired	Asct-Pro1.	NET UP	- links
17	SOURAY BOSE	Asst. Prof	MITUR	512
18	B. K. Hemant	AP, MSIT Delhi-58		get P. A
19	Deepshikha Singh	Ph.D.Scholar	NITUK	Legi
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Day: 01

Date: 04/11/19

I			Signaturé			
S.N.	Name	Designation	Morning Session	Evening Session		
1	Dr. Tajinder Singh Arora	Asst. Prof., ECE Dept.	1981	my my		
2	Dr. Sarika Pal	Asst. Prof., ECE Dept.	Gentle	Gunta		
3	Dr. Pankaj Kumar Pal	Asst. Prof., ECE Dept.				
4	Dr. Tushar Goel	Asst. Prof., ECE Dept.	The state of the s	- Ju		
5	Ms. Sarita Yadav	Trainee Teacher, ECE Dept.	lan	Ser		
6	Mr. Mandeep Singh	Teaching Associate, ECE	Dp_	Wo.		
7	Mr. Rajesh Saha	Project Eng. (SMDP-C2SD)	christs	Lyeron		
8	Mr. Rajeev Kumar	Project Lecturer	Roiny	र्रव्याप्य		
9	Prof. J. S. Ubhi	Professor SLIET Longowal				
10	Er. Pankaj Kumar Das	Asst. Prof., SLIET Longowal	137	4000		
11	Dr. Prakash Dwivedi	Asst. Prof., EEE Dept.	Joseph James	Livetest		
12	Dr. Sourav Bose	Asst. Prof., EEE Dept.	372	3%		
13	Ms. Ruchi Juyal	Ph.D. Scholar, ECE Dept.	P-	K.		
14	Mr. Lalit Kumar Garia	Ph.D. Scholar, ECE Dept.	Labot	LaW		
15	Ms. Deepshika Singh	Ph.D. Scholar, ECE Dept.	Kes/	* Heer		
16	Mr. Varun Kumar Kakar	Ph.D. Scholar, ECE Dept.	via 1	Va		
	Mr. Sachin Tiwari	Ph.D. Scholar, ECE Dept.	Sandry	Jacks:		
18	Mr. B. K. Hemant	Ph.D. Scholar, ECE Dept.	lou	Sh		
19	Mr. Maneesh Kumar Singh	Ph.D. Scholar, ECE Dept.	Manis	Mary		
20	Mr. Arvind Bisht	Ph.D. Scholar, ECE Dept.	And	Day		
21	Mr. Sumit Kumar	M.Tech. Scholar, ECE Dept.	Sumit Kumar	Sumit Kumar		
22	Mr. Raghavendra Nath Yadav	M.Tech. Scholar, ECE Dept.	-Reghamendre.	Tophereby		
23	Mr. Shivam Tripathi	M.Tech. Scholar, EEE Dept.	201	13/97		
24	Mr. Mukesh Kumar	Ph.D. Scholar, SLIET Longowal	9K	(A)		
25	Mr. Jasvir Singh Kalsi	Ph.D. Scholar, SLIET Longowal	11	1/4		
26	Ms. Ekta priya darshani	M.Tech. Scholar, EEE Dept.				
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Day: 02

Date: 05/11/19

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S.Ņ.	Name	Designation	Morning Session	Evening Session
1	Dr. Tajinder Singh Arora	Asst. Prof., ECE Dept.	ns+	2/1
2	Dr. Sarika Pal	Asst. Prof., ECE Dept.	Same	Sail
3	Dr. Pankaj Kumar Pal	Asst. Prof., ECE Dept.		. /
4	Dr. Tushar Goel	Asst. Prof., ECE Dept.	Lake	- Gri
5	Ms. Sarita Yadav	Trainee Teacher, ECE Dept.	Leur	Jan
6	Mr. Mandeep Singh	Teaching Associate, ECE	190_	AD _
7	Mr. Rajesh Saha	Project Eng. (SMDP-C2SD)	houses	Carrie
8	Mr. Rajeev Kumar	Project Lecturer	Rancy	Rejuy
9	Prof. J. S. Ubhi	Professor SLIET Longowal		
10	Er. Pankaj Kumar Das	Asst. Prof., SLIET Longowal	426	4 2a 1
11	Dr. Prakash Dwivedi	Asst. Prof., EEE Dept.		Thotalk
12	Dr. Sourav Bose	Asst. Prof., EEE Dept.	5/1	374
13	Ms. Ruchi Juyal	Ph.D. Scholar, ECE Dept.	l -	
. 14	Mr. Lalit Kumar Garia	Ph.D. Scholar, ECE Dept.	Latt	1.dVh
15	Ms. Deepshika Singh	Ph.D. Scholar, ECE Dept.	Ly.	*ves
16	Mr. Varun Kumar Kakar	Ph.D. Scholar, ECE Dept.	1781	· 75
17	Mr. Sachin Tiwari	Ph.D. Scholar, ECE Dept.	Just	Sas
18	Mr. B. K. Hemant	Ph.D. Scholar, ECE Dept.	BURL	Lou
19	Mr. Maneesh Kumar Singh	Ph.D. Scholar, ECE Dept.	Manyla	Many
20	Mr. Arvind Bisht	Ph.D. Scholar, ECE Dept.	Rad	"Dul
21	Mr. Sumit Kumar	M.Tech. Scholar, ECE Dept.	Symit Kymry	Lunit Kumm
22	Mr. Raghavendra Nath Yadav	M.Tech. Scholar, ECE Dept.	Raghaver La:	Poghaven de
23	Mr. Shivam Tripathi	M.Tech. Scholar, EEE Dept.	Dan_	-शि नम्
24	Mr. Mukesh Kumar	Ph.D. Scholar, SLIET Longowal	Re-	120
25	Mr. Jasvir Singh Kalsi	Ph.D. Scholar, SLIET Longowal	ds	1/1
	Ms. Ekta priya darshani	M.Tech. Scholar, EEE Dept.		
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Day: 03

Date: 06/11/19

S.N.	Name	Designation		ature
			Morning Session	Evening Session
1	Dr. Tajinder Singh Arora	Asst. Prof., ECE Dept.	714	34
2	Dr. Sarika Pal	Asst. Prof., ECE Dept.	South	Soul
3	Dr. Pankaj Kumar Pal	Asst. Prof., ECE Dept.		
4	Dr. Tushar Goel	Asst. Prof., ECE Dept.	Burl	- Ju
5	Ms. Sarita Yadav	Trainee Teacher, ECE Dept.	San	Lan
6	Mr. Mandeep Singh	Teaching Associate, ECE	WP_	M.
7	Mr. Rajesh Saha	Project Eng. (SMDP-C2SD)	Lywiser	Cozesta
8 .	Mr. Rajeev Kumar	Project Lecturer	fayer	famy
9	Prof. J. S. Ubhi	Professor SLIET Longowal		
10	Er. Pankaj Kumar Das	Asst. Prof., SLIET Longowal	436	4.000
11	Dr. Prakash Dwivedi	Asst. Prof., EEE Dept.		Tratat
12	Dr. Sourav Bose	Asst. Prof., EEE Dept.	5/3	(, , , , , , , , , , , , , , , , , , ,
13	Ms. Ruchi Juyal	Ph.D. Scholar, ECE Dept.	14-1	
14	Mr. Lalit Kumar Garia	Ph.D. Scholar, ECE Dept.	LaWt	Laht
15	Ms. Deepshika Singh	Ph.D. Scholar, ECE Dept.	tres	tre!
	Mr. Varun Kumar Kakar	Ph.D. Scholar, ECE Dept.	13	43
	Mr. Sachin Tiwari	Ph.D. Scholar, ECE Dept.	Salt ()	Jada 1
	Mr. B. K. Hemant	Ph.D. Scholar, ECE Dept.	1 on	Jon-
	Mr. Maneesh Kumar Singh	Ph.D. Scholar, ECE Dept.	March	- Names
	Mr. Arvind Bisht	Ph.D. Scholar, ECE Dept.	And	Ord
21	Mr. Sumit Kumar	M.Tech. Scholar, ECE Dept.	Sumi't Kymm	Simul Kumar
22	Mr. Raghavendra Nath Yadav	M.Tech. Scholar, ECE Dept.	Roghamendora.	Padaren Ja.
	Mr. Shivam Tripathi	M.Tech. Scholar, EEE Dept.	121a71	হিবস_
24	Mr. Mukesh Kumar	Ph.D. Scholar, SLIET Longowal	90	MA
25	Mr. Jasvir Singh Kalsi	Ph.D. Scholar, SLIET Longowal	Th	des
26	Ms. Ekta priya darshani	M.Tech. Scholar, EEE Dept.	/	/
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Day: 014

Date: 07/11/19

			Signature		
S.N.	Name	Designation	Morning Session	Evening Session	
1	Dr. Tajinder Singh Arora	Asst. Prof., ECE Dept.	Morning Session	TVEITING SESSION	
2	Dr. Sarika Pal	Asst. Prof., ECE Dept.	Garden	Salm	
3	Dr. Pankaj Kumar Pal	Asst. Prof., ECE Dept.			
4	Dr. Tushar Goel	Asst. Prof., ECE Dept.	- Lun	Print.	
5	Ms. Sarita Yadav	Trainee Teacher, ECE Dept.	(and	(70 A)	
6	Mr. Mandeep Singh	Teaching Associate, ECE	14	A	
7	Mr. Rajesh Saha	Project Eng. (SMDP-C2SD)	Ryests	Round	
8	Mr. Rajeev Kumar	Project Lecturer	Round	Râuy	
9	Prof. J. S. Ubhi	Professor SLIET Longowal		1003	
10	Er. Pankaj Kumar Das	Asst. Prof., SLIET Longowal	you	Tu V	
11	Dr. Prakash Dwivedi	Asst. Prof., EEE Dept.	1	Lindon	
12	Dr. Sourav Bose	Asst. Prof., EEE Dept.		5/2	
13	Ms. Ruchi Juyal	Ph.D. Scholar, ECE Dept.			
14	Mr. Lalit Kumar Garia	Ph.D. Scholar, ECE Dept.	Latt	Lahr	
15	Ms. Deepshika Singh	Ph.D. Scholar, ECE Dept.	May .	sest	
16	Mr. Varun Kumar Kakar	Ph.D. Scholar, ECE Dept.	Sa	179	
	Mr. Sachin Tiwari	Ph.D. Scholar, ECE Dept.	feeto	Deur O	
18	Mr. B. K. Hemant	Ph.D. Scholar, ECE Dept.	1 on	- Jan	
	Mr. Maneesh Kumar Singh	Ph.D. Scholar, ECE Dept.	Many.	Maris	
20	Mr. Arvind Bisht	Ph.D. Scholar, ECE Dept.	Frust	Arril	
21	Mr. Sumit Kumar	M.Tech. Scholar, ECE Dept.	Sumit Kymen	Sumit Kumar	
22	Mr. Raghavendra Nath Yadav	M.Tech. Scholar, ECE Dept.	Roghamadra.	Rayharand.	
	Mr. Shivam Tripathi	M.Tech. Scholar, EEE Dept.	यवम	-शिवन	
	Mr. Mukesh Kumar	Ph.D. Scholar, SLIET Longowal	1810	MS	
	Mr. Jasvir Singh Kalsi	Ph.D. Scholar, SLIET Longowal	94	451	
	Ms. Ekta priya darshani	M.Tech. Scholar, EEE Dept.			
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Day: 05

Date: 08/11/19

S.N.	Name		Sign	ature
3.14.		Designation	Morning Session	Evening Session
1	Dr. Tajinder Singh Arora	Asst. Prof., ECE Dept.	My	The
2	Dr. Sarika Pal	Asst. Prof., ECE Dept.	Southy	Save
3	Dr. Pankaj Kumar Pal	Asst. Prof., ECE Dept.		
4	Dr. Tushar Goel	Asst. Prof., ECE Dept.	Frank	Chr.
5	Ms. Sarita Yadav	Trainee Teacher, ECE Dept.	Zars	Sens
6	Mr. Mandeep Singh	Teaching Associate, ECE	Herr	Pen
7	Mr. Rajesh Saha	Project Eng. (SMDP-C2SD)	Preside	Cross
8	Mr. Rajeev Kumar	Project Lecturer	(out)	Rosel
9	Prof. J. S. Ubhi	Professor SLIET Longowal		13
10	Er. Pankaj Kumar Das	Asst. Prof., SLIET Longowal	420	Trans
11	Dr. Prakash Dwivedi	Asst. Prof., EEE Dept.		Though
12	Dr. Sourav Bose	Asst. Prof., EEE Dept.		SPZ
13	Ms. Ruchi Juyal	Ph.D. Scholar, ECE Dept.	for my	Par .
14	Mr. Lalit Kumar Garia	Ph.D. Scholar, ECE Dept.	Laht	Lawt
15	Ms. Deepshika Singh	Ph.D. Scholar, ECE Dept.	sul .	reed
16	Mr. Varun Kumar Kakar	Ph.D. Scholar, ECE Dept.	15	N
17	Mr. Sachin Tiwari	Ph.D. Scholar, ECE Dept.	led 1	Salt
18	Mr. B. K. Hemant	Ph.D. Scholar, ECE Dept.	My	Jay -
19	Mr. Maneesh Kumar Singh	Ph.D. Scholar, ECE Dept.	Marile	March
20	Mr. Arvind Bisht	Ph.D. Scholar, ECE Dept.	day	Bank
21	Mr. Sumit Kumar	M.Tech. Scholar, ECE Dept.	Sumit Kynnar	Sumit Kumm
22	Mr. Raghavendra Nath Yadav	M.Tech. Scholar, ECE Dept.	Resharedo.	Baharenda.
23	Mr. Shivam Tripathi	M.Tech. Scholar, EEE Dept.	बिवर्ग	Pan
24	Mr. Mukesh Kumar	Ph.D. Scholar, SLIET Longowal	RA .	Alx
25	Mr. Jasvir Singh Kalsi	Ph.D. Scholar, SLIET Longowal	190	- Br
26	Ms. Ekta priya darshani	M.Tech. Scholar, EEE Dept.		
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