Dr. D. Y. Patil Pratishthan's

DR. D. Y. PATIL INSTITUTE OF ENGINEERING, MANAGEMENT & RESEARCH

Approved by A.I.C.T.E, New Delhi , Maharashtra State Government, Affiliated to Savitribai Phule Pune University
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COMPUTER ENGINEERING DEPARTMENT

GUEST LECTURE

Table of Content

Sr. No	Content	Page No.

GUEST LECTURE

On

TURING MACHINE – THEORY OF COMPUTATION

Participants	**:** TE students of DYPIEMR
Venue	**:** DYPIEMR, Seminar Hall Dr. D. Y. Patil Educational Complex**,** Akurdi, Pune – 44
Date	**:** 18/08/17
Organizing Team	**:** Ms. Ketaki Bhoyar, Subject Teacher TOC. Mrs. Abha Jain **,** CSI Coordinator

1. Objectives

- Understand the Overview of Theory of computation(TOC)
- Discuss Turing Machine model in detail
- Applications of Turing Machine
- Applications and research areas of TOC

2. Information about Speaker

MR. VIVEK KULKARNI

Work Experience:

- Currently Working as **Chief architect, Persistent Systems Pvt. Ltd., Erandwana**

3. Report

Name of the Speaker: Mr Vivek Kulkarni

Designation: Chief architect,

Company: Persistent Systems Pvt. Ltd., Erandwana, Pune.

Title: Turing Machine – Theory of Computation

Day & Date: 18/08/2017

Highlights of the Talk:

- Overview of Theory of computation(TOC)
- Turing Machine model in detail
- Applications of Turing Machine
- Applications and research areas of TOC

The Session was organized at the Seminar Hall at 09.00am for the TE Computer Engineering Students as a part of covering the contents beyond syllabus.

Details of the session:

Vivek Kulkarni, author of book Theory of Computation published by Oxford University, gave an insight to the students of third year to correlate object oriented programming and theory of computation. Following topics were covered in the lecture.

1. Set theory

   Set theory is a branch of mathematical logic that studies sets, which informally are collections of objects. Although any type of object can be collected into a set, set theory

is applied most often to objects that are relevant to mathematics. The language of set theory can be used in the definitions of nearly all mathematical objects.

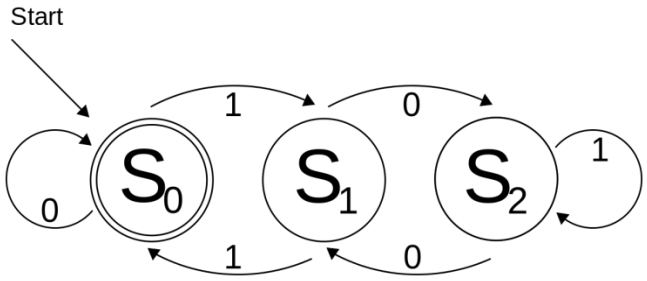
The modern study of set theory was initiated by Georg Cantor and Richard Dedekind in the 1870s. After the discovery of paradoxes in naive set theory, such as the Russell's paradox, numerous axiom systems were proposed in the early twentieth century, of which the Zermelo–Fraenkel axioms, with or without the axiom of choice, are the best-known.

Set theory is commonly employed as a foundational system for mathematics, particularly in the form of Zermelo–Fraenkel set theory with the axiom of choice. Beyond its foundational role, set theory is a branch of mathematics in its own right, with an active research community. Contemporary research into set theory includes a diverse collection of topics, ranging from the structure of the real number line to the study of the consistency of large cardinals.

2. Deterministic Finite Automata

In the theory of computation, a branch of theoretical computer science, a deterministic finite automaton (DFA)—also known as a deterministic finite acceptor (DFA) and a deterministic finite state machine (DFSM)—is a finite-state machine that accepts and rejects strings of symbols and only produces a unique computation (or run) of the automaton for each input string. Deterministic refers to the uniqueness of the computation. In search of the simplest models to capture finite-state machines, McCulloch and Pitts were among the first researchers to introduce a concept similar to finite automata in 1943.

The figure illustrates a deterministic finite automaton using a state diagram. In the automaton, there are three states: S0, S1, and S2 (denoted graphically by circles). The automaton takes a finite sequence of 0s and 1s as input. For each state, there is a transition arrow leading out to a next state for both 0 and 1. Upon reading a symbol, a DFA jumps deterministically from one state to another by following the transition arrow. For example, if the automaton is currently in state S0 and the current input symbol is 1, then it deterministically jumps to state S1. A DFA has a start state (denoted graphically by an arrow coming in from nowhere) where computations begin, and a set of accept states (denoted graphically by a double circle) which help define when a computation is successful.



3. Push Down Automata

   In computer science, a pushdown automaton (PDA) is a type of automaton that employs a stack.

   Pushdown automata are used in theories about what can be computed by machines. They are more capable than finite-state machines but less capable than Turing machines. Deterministic pushdown automata can recognize all deterministic context-free languages while nondeterministic ones can recognize all context-free languages, with the former often used in parser design.

   The term "pushdown" refers to the fact that the stack can be regarded as being "pushed down" like a tray dispenser at a cafeteria, since the operations never work on elements other than the top element. A stack automaton, by contrast, does allow access to and operations on deeper elements. Stack automata can recognize a strictly larger set of languages than pushdown automata.[1] A nested stack automaton allows full access, and also allows stacked values to be entire sub-stacks rather than just single finite symbols.

4. Turing Machine

   A Turing machine is a mathematical model of computation that defines an abstract machine which manipulates symbols on a strip of tape according to a table of rules. Despite the model's simplicity, given any computer algorithm, a Turing machine can be constructed that is capable of simulating that algorithm's logic.

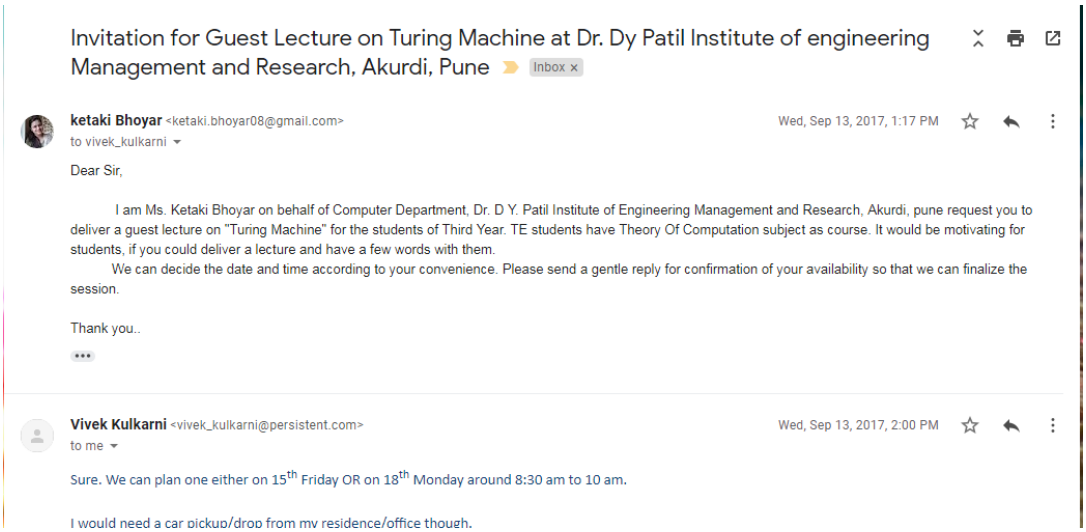
   The machine operates on an infinite memory tape divided into discrete cells. The machine positions its head over a cell and "reads" (scans) the symbol there. Then, as per the symbol and its present place in a finite table of user-specified instructions, the machine (i) writes a symbol (e.g. a digit or a letter from a finite alphabet) in the cell (some models allowing symbol erasure or no writing), then (ii) either moves the tape one cell left or right (some models allow no motion, some models move the head), then (iii) (as determined by the observed symbol and the machine's place in the table) either proceeds to a subsequent instruction or halts the computation.

Snapshot 1: Students Listening Guest Lecture

Snapshot 2: Students Listening Guest Lecture

Snapshot 3: Students Listening Guest Lecture

Invitation Letter To Guest



Invitation for Guest Lecture on Turing Machine at Dr. Dy Patil Institute of engineering Management and Research, Akurdi, Pune Inbox ×

ketaki Bhoyar <ketaki.bhoyar08@gmail.com> Wed, Sep 13, 2017, 1:17 PM

to vivek_kulkarni

Dear Sir,

I am Ms. Ketaki Bhoyar on behalf of Computer Department, Dr. D Y. Patil Institute of Engineering Management and Research, Akurdi, pune request you to deliver a guest lecture on "Turing Machine" for the students of Third Year. TE students have Theory Of Computation subject as course. It would be motivating for students, if you could deliver a lecture and have a few words with them.

We can decide the date and time according to your convenience. Please send a gentle reply for confirmation of your availability so that we can finalize the session.

Thank you..

•••

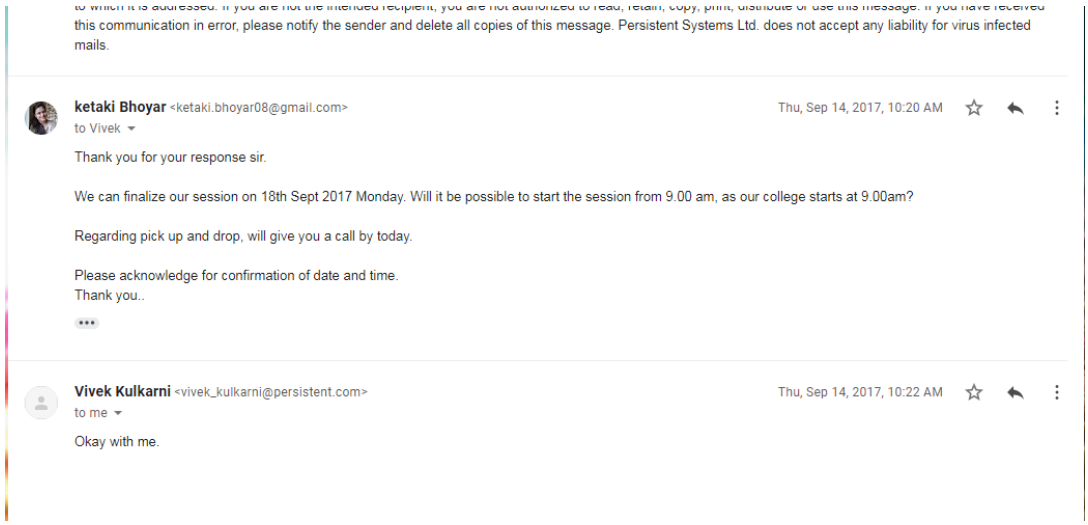
Vivek Kulkarni <vivek_kulkarni@persistent.com> Wed, Sep 13, 2017, 2:00 PM

to me

Sure. We can plan one either on 15th Friday OR on 18th Monday around 8:30 am to 10 am.

I would need a car pickup/drop from my residence/office though.

Acceptance of Invitation



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ketaki Bhoyar <ketaki.bhoyar08@gmail.com> Thu, Sep 14, 2017, 10:20 AM

to Vivek

Thank you for your response sir.

We can finalize our session on 18th Sept 2017 Monday. Will it be possible to start the session from 9.00 am, as our college starts at 9.00am?

Regarding pick up and drop, will give you a call by today.

Please acknowledge for confirmation of date and time.
Thank you..

Vivek Kulkarni <vivek_kulkarni@persistent.com> Thu, Sep 14, 2017, 10:22 AM

to me

Okay with me.

Learning Outcomes

- Students are able to understand the Overview of Theory of computation(TOC)
- Students get information about Turing Machine model in detail
- Students have understood applications of Turing Machine
- Students came to know Applications and research areas of TOC

NOTICE

Dr. D. Y. Patil Institute of Engineering,
Management and Research, Akurdi, Pune – 44
Department of Computer Engineering

NOTICE

Academic Year: 2017-18
Semester: I

Date: 14/08/2017
Year : T.E.

All the students of TE A and B div are informed that a guest session is organized on the concepts of Turing Machine from Theory of computation on 18th August 2017 at 9.00 am sharp. The speaker is Mr. Vivek Kulkarni, Chief architect, Persistent Systems Pvt. Ltd., Erandwana, who is author of the book **"Theory of Computation"**.
This session will be helpful to clear more concepts about Turing Machine along with its applications.

Time: 09:00 am – 11:00am
Venue: Seminar Hall

Note: It is mandatory for all to attend this lecture.

Ms. Ketaki bhoyar
ACM Student Chapter Coordinator

Prof. P. P. Shevatekar
Head of the Department
Department of Computer Engineering
Dr. D.Y. Patil Institute of Engineering
Management & Research, Akurdi, Pune - 411 044

ATTENDANCE RECORD

Dr. D. Y. Patil Institute of Engineering, Management and

Department of Computer Engineering

Turing Machine-TOC Guest Lecture

Attendance TE (A)

Date: 18/09/17

SR. NO	ROLL NO	NAME OF THE STUDENT	Sign
1	TEA15101	GALPHADE ABHISHEK NARSING	
2	TEA15104	NIKAM NILESH ASHOK	
3	TEA15105	MANDLIK PRATHAMESH	
4	TEA15106	KAMBLE SNEHAL SUNIL	
5	TEA15107	PADHYE SARANG SACHIN	
6	TEA15108	MAHAJAN ANIKET SATISH	
7	TEA15109	VIMAL RATHOD	
8	TEA15110	WANKHEDE SUSHILKUMAR	
9	TEA15111	NALGIRE PRITI VIJAYKUMAR	
10	TEA15113	ATUL GAWANDE	
11	TEA15114	PATIL MADHURI RAVINDRA	
12	TEA15116	KULKARNI SEJAL SATCHIT	
13	TEA15117	SHAHADE BHAGYASHREE	
14	TEA15118	AKASH SAHAY	
15	TEA15119	AKSHAYA H	
16	TEA15120	MHETRE HARSHADA SATISH	
17	TEA15121	PRATYUSHA PATIL	
18	TEA15122	MANE GANESH SEVAKRAM	
19	TEA15123	SHELAR MANGESH SHANTARAM	
20	TEA15124	DIMBLE RENUKA NARENDRA	
21	TEA15125	DHURI GARGI GANPAT	
22	TEA15126	PATIL PRIYANKA CHANDRAKANT	
23	TEA15127	SAKSHI RAYU	
24	TEA15128	KALBHOR RUTUJA DILIP	
25	TEA15129	ABHINAV SINHA	
26	TEA15130	RAUT PRAJAKTA ANIL	
27	TEA15131	DANGE AKSHAY SHANKARRAO	
28	TEA15132	CHAUHAN AVI SANJAYBHAI	
29	TEA15133	JAGTAP AMOL SANJAY	
30	TEA15134	KAVALE NIKHIL MAHESH	
31	TEA15136	SUKHJEET SINGH	
32	TEA15137	THUL SAMEER DILIP	
33	TEA15138	SUDESHNA CHAKRAVARTY	
34	TEA15139	PRIYANKA CHANDRABALAN	
35	TEA15140	SIDDHARTHA KIRAN PATKI	
36	TEA15141	YASH KANUNGO	

37	TEA15142	ARVIND S	
38	TEA15144	BHOITE AKANKSHA AJIT	
39	TEA15145	SURYAWANSHI SURAJ MADHUKAR	
40	TEA15146	YEWALKAR VASUNDA DILIP	
41	TEA15147	PRIYADARSHI SUJIT SINGH	
42	TEA15148	BHANU PRATAP	
43	TEA15149	ABHI SINGH	
44	TEA15150	Shivani Subhash Lahane	
45	TEA15151	Vaibhavi Dilip Kachhawa	
46	TEA15152	Sayyad Tammana	
47	TEA15153	KOSE MEGHA NAGORAO	
48	TEA15154	Prateek Kalsekar	
49	TEA15155	Amit Gagade	
50	TEA15156	Shweta Phandnis	
51	TEA15157	Maithali Misal	
52	TEA15162	Mrunali Mukunda Patil	
53	TEA15163	shivani vinod alldwar	
54	TEA15164	Nikita Sunil Raykar	
55	TEA15165	Tejshree Balkrishna Wadekar	
56	TEA15166	LAUKIK S KAKADE	
57	TEA15167	SHUBHAM B MASULKAR	
58	TEA15168	Anuradha Datta Ranmale	
59	TEA15169	Ankita Babasaheb Kadam	
60	TEA15170	Tanuja Suresh Khedekar	
61	TEA15171	Krishna Patil	
62	TEA15172	SHRUTI SHELKE PANDIT RAO	
63	TEA15173	ADITI ANIL ADHAV	
64	TEA15174	Namrata Darekar	
65	TEA15175	Aishwarya dilip Rupanwar	
66	TEA15176	ABHISHEK PAWAR	
67	TEA15177	Bhagyashri Balaji Suvaranakar	
68	TEA15178	Dhonde Shital dnyanoba	
69	TEA15179	SHAHANE ASHISH ANIL	
70	TEA15180	Bhaldar Tarannum	
71	TEA15181	Ghugare Komal	
72	TEA15182	Karape Shraddha	
73	TEA15183	Khajekar Poonam	
74	TEA15184	Dhananjay More	
75	TEA15185	Himanshu Kumar	
76	TEA15186	Chetan Patil	
77	TEA15187	Ankit Wardhan	
78	TEA15188	Shubhang Magotra	

Ms. Ketaki Bhoyar
Mrs. Tanuja Lonhari

Mrs. Abha Jain
Mrs. Shivganga Gavhane
Mrs. Suvarna Patil

Dr. D. Y. Patil Institute of Engineering, Management and Research,
Department of Computer Engineering
Turing Machine-TOC Guest Lecture
Attendance TE (B)

Date: 18/09/17

SR. NO	ROLL NO	NAME OF THE STUDENT	Sign
1	TEB15101	SALUNKE SHUBHAM RADISH	
2	TEB15102	MANE SEEMA APPASAHEB	
3	TEB15103	BHAGWAT TEJAS ARUN	
4	TEB15104	KOHLI JASVINDERSINGH T	
5	TEB15105	JAVALGE PRAJAKTA LIMBRAJ	
6	TEB15106	SHAIKH SHABNAM FIROZ	
7	TEB15107	SHASHANK VIJAISINGH SOMBANSI	
8	TEB15108	SABAHATBEGUM AFIFUDDIN KAZI	
9	TEB15109	MISHRA SIDDHARTH MANOJ	
10	TEB15110	PATIL PALLAVI SANJAY	
11	TEB15111	SOLANKI REENA LAXMANBHAI	
12	TEB15112	NIRHALI NIKITA ANANT	
13	TEB15113	MANGWANI FALGUNI RAJENDRA	
14	TEB15114	SHAIKH MOHAMMEDFAHAD FAZAL	
15	TEB15115	SNEHA DILIP BIRADAR	
16	TEB15116	ASMITA SHARMA	
17	TEB15118	SHAIKH ASRA FARHIN	
18	TEB15120	AMBHORE SHRADDHA ARUN	
19	TEB15121	SHAH DRASHYA NIPUNKUMAR	
20	TEB15122	DHANAWADE GAURI PRAKASH	
21	TEB15123	SHUBHAM SINGH	
22	TEB15125	MOHD GOUS MOHD RAFIQ H	
23	TEB15126	KHANDALE RUSHIKESH VIJAY	
24	TEB15127	KHAN SHAHBAZ QUASIM	
25	TEB15128	PAPAT TANMAY SUNIL	
26	TEB15129	SAWANT SAMRUDDHI VIJAY	
27	TEB15130	HAJARE ANKIT VIJAY	
28	TEB15131	JADHAV ADITYA RAJESH	
29	TEB15132	CHOPADE SANDIP SAHEBRAO	
30	TEB15133	PAL DEEPAK DHARMU	
31	TEB15134	JAKINKAR GAUTAMEE ANAND	
32	TEB15136	GAIKWAD CHAITANYA EKNATH	
33	TEB15137	PANJWANI ROHIT DILEEP	
34	TEB15138	PRATEEK PANDEY	
35	TEB15139	ASHISH SHAH	
36	TEB15140	FULZELE ADHVARYU ARUN	
37	TEB15141	CHAURASIA RAJAT ARBIND	

38	TEB15142	MAYANK GANGWANI	
39	TEB15143	FAIZAN MALIK	
40	TEB15144	NIKAM ANIKET SANDEEP	
41	TEB15145	UDAPE CHARUSHILA DASHRATH	
42	TEB15148	SHREYA R PATIL	
43	TEB15149	SANIL G NAIK	
44	TEB15150	TEJASWININ PATEL	
45	TEB15152	KARTHIK JADHAV	
46	TEB15155	ROHIT DHOBALE	
47	TEB15156	RISHU RAJ	
48	TEB15157	ARNAZ SHAIKH	
49	TEB15158	APOORVA KALE	
50	TEB15159	ASHISH S VAROTE	
51	TEB15160	ADITYA D JADHAV	
52	TEB15161	VIKAS B GAIKWAD	
53	TEB15162	PRIYANKA B MORE	
54	TEB15163	NIKITA AIWALE	
55	TEB15164	DEVALKAR GANESH BIBHISHAN	
56	TEB15165	MAYURI MARUTI UANWANE	
57	TEB15166	GUNWANTI SUDHIR MAHAJAN	
58	TEB15167	PRIYANKA KHAIRNAR	
59	TEB15168	PRATIK SONAWANE	
60	TEB15169	PRASAD CHINCHOLKAR	
61	TEB15170	SHUBHAM S BHALERAO	
62	TEB15171	ADE SWATI RAJKUMAR	
63	TEB15172	SHIVANI RAKESH PAMPATTIWAR	
64	TEB15173	HIRAVE MANISHA R	
65	TEB15174	JADHAV VAISHNAVI V	
66	TEB15175	SONWANE PRIYANKA SHAHIR	
67	TEB15176	JADHAV GEETA RAOSAHEB	
68	TEB15177	NIKITA VITTHAL SUKRE	
69	TEB15178	RATNMALA BALU MANE	
70	TEB15180	Shweta Limje	
71	TEB15181	Satyam Sundaram	
72	TEB15182	Prakhar Ranjan	
73	TEB15184	Sai Guthula	
74	TEB15185	AJINKYA Uttarwar	
75	TEB15186	VAIBHAV Ghule	
76	TEB15187	VISHAL DIXIT	

Ms. Ketaki Bhoyar
Mrs. Tanuja Lonhari
Coordinators

Mrs. Abha Jain
Mrs. Shivganga Gavhane
Mrs. Suvarna Patil
Coordinators

FEEDBACK FORM

Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi, Pune – 44

Department of Computer Engineering

Theory of Computation Guest Lecture Feedback Form

Date: 18/09/2017

Name of Participant: Tanuja Suresh Khedekar

College/Institute: DYPIEMR, Akurdi, Pune

Contact Number: 8411872388

Please indicate your impression of items listed below:

Sr.No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
01	Guest Lecture objectives were stated clearly and met my expectation.	✓				
02	Guest Lecture was well organized.	✓				
03	I will be able to apply the acquired knowledge in my day to day life.	✓				
04	The Guest Lecture was well organized and easy to follow.	✓				
05	The speaker was knowledgeable inspiring and appealing to the audience.	✓				
06	Adequate time was provided for question and discussion.	✓				

06. How do you rate the guest lecture overall?

Excellent	Good	Average	Poor	very poor
✓	○	○	○	○

07. Would you like to have such guest lecture in the future also? YES/No and Why?

08. Suggestions/Recommendations

No Suggestion

THANK YOU FOR YOUR PARTICIPATION!

Tanuja

Signature

Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi, Pune – 44

Department of Computer Engineering

Theory of Computation Guest Lecture Feedback Form

Date: 18/09/2017

Name of Participant: Bhagyashri Balaji Suvarnakar

College/Institute: DYPIEMR, Akurdi, Pune

Contact Number: 9822046915

Please indicate your impression of items listed below.

Sr.No.	Questions	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
01	Guest Lecture objectives were stated clearly and met my expectation.		✓			
02	Guest Lecture was well organized.	✓				
03	I will be able to apply the acquired knowledge in my day to day life.		✓			
04	The Guest Lecture was well organized and easy to follow.	✓				
05	The speaker was knowledgeable inspiring and appealing to the audience.	✓				
06	Adequate time was provided for question and discussion.	✓				

06. How do you rate the guest lecture overall?

Excellent	Good	Average	Poor	very poor
✓	○	○	○	○

07. Would you like to have such guest lecture in the future also? YES/No and Why?

Yes, I would like to have such guest lecture one more time

08. Suggestions/Recommendations

THANK YOU FOR YOUR PARTICIPATION!

Signature

Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi, Pune – 44

Department of Computer Engineering

Theory of Computation Guest Lecture Feedback Form

Date: 18/09/2017

Name of Participant: Tanuja Suresh Khedekar

College/Institute: DYPIEMR, Akurdi, Pune

Contact Number: 8411872388

Please indicate your impression of items listed below.

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04	The Guest Lecture was well organized and easy to follow.	✓				
05	The speaker was knowledgeable inspiring and appealing to the audience.	✓				
06	Adequate time was provided for question and discussion.	✓				

06. How do you rate the guest lecture overall?

Excellent	Good	Average	Poor	very poor
✓	○	○	○	○

07. Would you like to have such guest lecture in the future also? YES/No and Why?

08. Suggestions/Recommendations

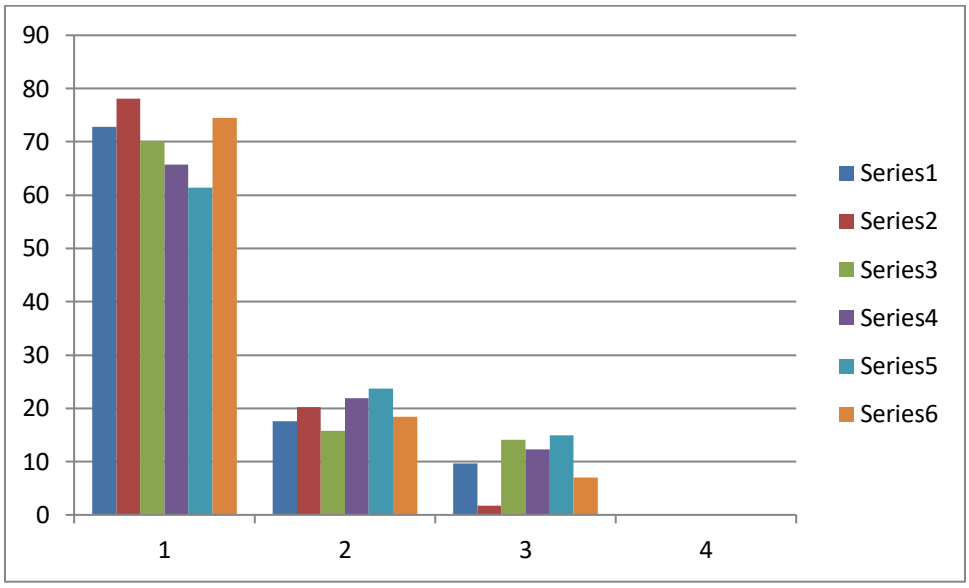
No Suggestion

THANK YOU FOR YOUR PARTICIPATION!

Tanuja

Signature

ANALYSIS OF FEEDBACK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Series2
Series3
Series4
Series5
Series6

Letter Of Conduction

Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi, Pune - 44

Department of Computer Engineering

CONDUCTION CERTIFICATE

This is to certify that Mr. Vivek Kulkarni, Chief Architect – Persistent-LABS, Persistent Systems Ltd. has conducted Guest Lecture on "Turing Machine – Theory of Computation" at Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi on 18/09/17 for the students of Third Year.

We thank you for your valuable inputs.

COMPUTER ENGINEERING

PPShevatekar

Prof. P. P. Shevatekar
Head of the Department

Department of Computer Engineering
Dr. D.Y. Patil Institute of Engineering
Management & Research, Akurdi, Pune - 411 04

Speaker’s Feedback

Dr. D. Y. Patil Institute of Engineering, Management and Research, Akurdi, Pune – 44

Department of Computer Engineering

Year : 2017-18

Date: 18/09/2017

Feedback

All lecturers & students were very receptive. Enjoyed the session.