Government of India Initiative for Employability Enhancement

Mentoring
Passionate Academicians
for Future Generation
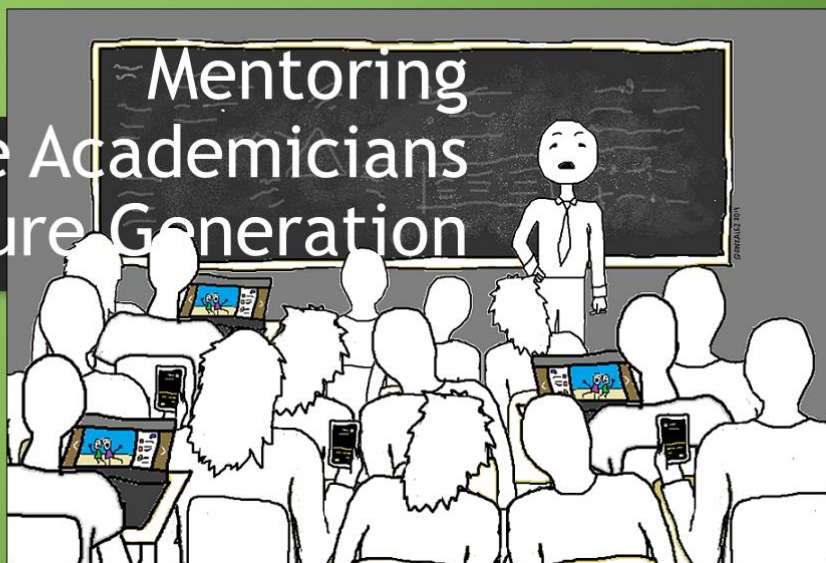
- *Faculty Training*
- *Training and Consultancy*
- *Services for Industry*
- *Technical Incubation and Entrepreneurship*
- *Continuing Education for Students & Professionals*

1. Broadband Highways
2. Universal Access to Mobile Connectivity
3. Public Internet Access Programme
4. e-Governance – Reforming Government through Technology
5. eKranti - Electronic delivery of services
6. Information
7. Electronics Manufacturing
8. IT for Jobs
9. Early Harvest Programmes

| IIT Guwahati | IIITDM Jabalpur | MNIT Jaipur | IIT Kanpur | NIT Patna | IIT Roorkee | NIT Warangal |

India is fast emerging as a world power in Information, Communications Technology and Electronics (ICTE) sectors. To complement its growth and further development, there is an ever-increasing need for trained professionals with specialization in this space. This includes training of professionals not only in existing and changing technologies but also in the fields of R&D and electronics manufacturing. This will specifically be aimed at the ICTE sector to create a substantial resource pool of talent and generate ample opportunities for entrepreneurs. Ministry of Electronics & Information Technology (MeitY) has approved a scheme and **setup Electronics and ICT Academies at 07 (seven) institutions viz. IIT Guwahati, IIT Kanpur, NIT Warangal, NIT Patna and IIITDM Jabalpur (all five under Category-A); and IIT Roorkee, MNIT Jaipur (both under Category B).** The Ministry had earlier setup two ICT Academies at Tamil Nadu and Kerala respectively. Estimated cost and targets for the Electronics and ICT Academy in the two Categories for a period of four years are as under:

Category	Total Outlay	Internal Revenue Generation	Grants-in-Aid from Central Government	Training Target (Faculty members)
Category-A	Rs. 25 crore	Rs. 7.50 crore	Rs. 17.50 crore	16,000
Category-B	Rs. 10 crore	Rs. 3.00 crore	Rs. 7.00 crore	6,400

These Academies are aimed at faculty/mentor development and upgradation to improve the employability of the graduates, diploma holders in various streams, through collaboration of States/Union Territories. Each Academy is being provided funding support for four years and is expected to generate revenue by charging fee and taking up other activities to meet the recurring cost in a gradual manner and become self-sustainable by the end of fourth year onwards. All these Academies will cater to the requirements of identified neighbouring States and UTs also. Brief information about all the Academies is available at :
https://meity.gov.in/esdm/scheme-financial-assistance-setting-electronics-and-ict-academies

Activities of the Academies

* Faculty development for
    — Specialized training with hands-on on basic and advanced level topics for Engineering streams and
    — Domain based training on use of ICT tools and techniques for non-engineering streams
* Training and consultancy services for industry
* Curriculum development for industry
* Continuing Education programme for students / working professionals
* Design, Develop and Deliver specialized modules for specific research areas
* Providing advice and support for technical incubation and entrepreneurial activities

About Summer Courses

Faculty Development Programmes in core areas of Electronics and Information & Communication Technology (ICT) streams have been planned by academies for delivery during Summers (i.e., May – July 2019). All these summer courses will be offered through National Knowledge Network (NKN) based Video Conferencing, with lectures delivered by invited experts from IITs, NITs, IIITs and other premier institutes/industries. In addition, local course coordinators at respective academies /identified remote centres will take care of sessions on design orientation/activity linked problems/ assignments/ case studies and quiz test(s). All seven EICT Academies will host the participants simultaneously alongwith some select remote centres all over our country, through NKN-VC infrastructure. Candidates could attend the training programme at Academy locations or at identified remote centres as per the convenience. For registration participants need to apply to one of the Academies, however, they can attend the training programme at that Academy or any remote centre attached to that respective Academy, please refer to respective academy websites.

How to apply:

* A duly filled in application form in the prescribed form signed by the Head of the Institute to which the candidate belongs (along with demand draft) should reach by post to the local coordinator of the participating academy.
* Government of India norms will be followed for SC/ST category participants.
* The application form along with the DD can also be submitted in the online mode to Local Coordinator of the respective academy.

Note: Refer offering Academies websites for complete postal address and other details of summer courses.

Following are the programmes being offered in this Summers, May –July 2019:

S.No.	Course Name	Principal Coordinating Academy	Co-Principal Coordinating Academy	Starting date of Programme	Last date of receiving applications
1	Network Security	MNIT Jaipur Dr. E. S. Pilli	NIT Warangal Prof. R. B. V. Subramanyam	20 May 2019	13 May 2019
2	Deep learning and applications	IIT Roorkee Prof. Sanjeev Manhas	IIITDM Jabalpur Prof. Aparajita Ojha	27 May 2019	20 May 2019
3	Advancements in Signal Processing and Optimization Techniques	MNIT Jaipur Dr. S J Nanda	IIT Roorkee Dr. P. M. Pradhan	3 June 2019	27 May 2019
4	Embedded Systems & Interfacing hands-on	MNIT Jaipur Prof. Lava Bhargava	NIT Patna Dr. Bharat Gupta	10 June 2019	3 June 2019
5	Introduction to Programming: A Pedagogical Approach	IIT Kanpur Prof. B. V. Phani		17 June 2019	*10 June 2019*
6	Robotics & AI	IIITDM Jabalpur Prof. V. K. Gupta	NITW Prof. R. B. V. Subramanyam	24 June 2019	17 June 2019
7	Antenna Trends	IIT Guwahati Prof. R. Bhattacharjee	NIT Patna Dr. Jayanta Ghosh	1 July 2019	24 June 2019
8	VLSI Chip Design Hands on using open source EDA	IIT Guwahati Dr. Gaurav Trivedi	MNIT Jaipur Dr. C. Periasamy	8 July 2019	1 July 2019

Target Beneficiaries:

Interested Faculty of engineering/technical institutions are eligible to attend these summer courses.

Availability of seats at each offering Academy:

Fifty (50) seats are available for each course to be offered at each Academy/Remote Centre. Participants will be selected based on first-cum-first-serve basis by each academy. Selected participants will be communicated through e-mail / notified in E&ICT Academy websites.

Course duration:

Each course is designed as 3 credit equivalent for 40 hours (Theory Lectures, Hands-on/Design orientation/Activity linked problems/Assignments Problem Solving/Case Studies sessions/Quiz Tests)

Accommodation & Travel

Boarding and Lodging at Hostels/Guest House will be provided at free of cost only at Identified E&ICT Academies. For details please refer to respective Academy websites. At identified Remote centres only working lunch and snacks will be provided. No Travel Allowance will be paid to the participants.

Registration Fee for each Summer Course:

No Registration fee is charged for attending this programme planned at any designated academies/Remote centres. However, candidate should submit a Demand Draft of Rs.1000/- along with application form and the same will be handed over to the participant on the last day of the training. Certificate for participation as well as for Satisfactory performance will be given to the participants subject to fulfillment of attending all sessions, submission of assignments and clearing the test(s).

Mode of Payment:

Academy Name	Payment through DD
IIT Guwahati	Demand Draft in favor of **"Registrar, IIT Guwahati"** Payable at Guwahati
IIITDM Jabalpur	Demand Draft in favor of **"Electronics and ICT Academy, IIITDMJ"** payable at Jabalpur
MNIT Jaipur	Demand Draft in favor of **"Electronics and ICT Academy, MNIT Jaipur"** Payable at Jaipur
IIT Kanpur	Demand Draft in favor of **"Director, IIT Kanpur"** Payable at Kanpur
NIT Patna	Demand Draft in favor of **"Director, NIT Patna"** payable at Patna
IIT Roorkee	Demand Draft in favor of **"Dean SRIC IIT Roorkee"** payable at Roorkee
NIT Warangal	Demand Draft in favor of **"Electronics and ICT Academy, NITW"** payable at NIT Warangal

- Last Date for Submission of Applications is Monday of earlier week from the start date of respective programme.
- The intimation of Selection for participation will be posted on website on Wednesday of previous week.

The following are the details of Summer courses being offered during May – July 2019

Course 1: Network Security	20th - 24th May 2019

Prospective external Experts- (i) Prof. Sukumar Nandi, IITG (ii) Dr. Brijeswar Bezwada, IITH (iii) Lab- NetSim Inc. Bengaluru, (iv) Lab- ARISTA Inc.

Experts from host institutes- (v) Prof M. S. Gaur, IIT Jammu (vi) Dr. E. S. Pilli & (vii)Dr. R. B. Battula, MNITJ

Contents of modules of Network security

S.No	Module Name	Topics
1.	Network – Basics	Introduction to computer networks, Why TCP/IP model?, Introduction to Security; What are different securities? Basic Concepts - Network layers, attacks and securities.
2.	Blockchain Security and Websecurity	Introduction to blockchain technology and why it is so important? for networks. Introduction to web security model– why web security is important?, Web attacker, Network attacker and malware attacker, application layer protocols - HTTP, SMTP and etc. Document Object Model (DOM), Port scanning behind the firewall, Remote scripting, Isolation, and etc. Browser security, Communication, security user interface- When is it safe to type password? Mixed content, HTTP and HTTPS, Lock Icon 2.o and cookie security policy. Block chain technology for Networks; Web application security - SQL injection, CSRF, XSS and etc.
3.	Network Security - I	Security issues in IP protocols- HTTPS, TCP, DNS and etc Network defense tools: Firewalls, VPNs, Intrusion Detection, and filters
4.	Network Security - II	Routing layer attacks - ICMP, SBGP, MPLS and etc. and modern networks and security issues. Case studies/Demo- Modern Network security applications (IP Sec, SDN, NFV and etc.)
5.	Cloud and Future Networks security	Software defined network and attacks, NFV and etc. Cloud security Issues; IoT based attacks; Next Generation security issues
6.	Electronic Mail Security; Firewalls and Web Security	Distribution lists Establishing keys Privacy, source authentication, message integrity, non-repudiation, proof of submission, proof of delivery, message flow confidentiality, anonymity o Pretty Good Privacy (PGP); Packet filters Application level gateways Encrypted tunnels Cookies Web security problems

Principal Coordinator - Academy	Co- Principal Coordinator - Academy	Participating Academies and Local Coordinator Details
Dr. E. S. Pilli espilli.cse@mnit.ac.in M: 954 965 8131 MNIT Jaipur	Prof. R. B. V. Subramanyam eict.nitw@gmail.com M: 091210 16547 NIT Warangal	**IIITDM Jabalpur -** Dr. Manish Kumar Bajpai Email: mkbajpai@iiitdmj.ac.in Mobile: 9425156289
		MNIT Jaipur - *Dr. R. Battula* rbbattula.cse@mnit.ac.in M: 954 9654 395
		NIT Patna - *Dr. M P Singh* Email: mps@nitp.ac.in Mobile: 9431200106
		NIT Warangal - *Dr. R. Padmavathy* *Email : rpadma@nitw.ac.in* *Mobile: 9440173819*

Prospective external Experts- (i) Industry support from NVidia, MathWorks (MATLAB) (ii) Dr. Anupama Ray, IBM (iii) Dr. Ritu, Intel, (iv) Prof. R. Venkatesh Babu, IISc Banglore (v) Dr. Biplab Banerjee IITB
Experts from host institutes- (iii) Prof. R. Balasubramanian, IITR (iv) Prof. Aparajita Ojha, IIITDMJ (v) Dr. Partha Pratim Roy, IITR

Contents of modules of Deep Learning & Applications

S.No	Module Name	Topics
1.	l Neural Networks (ANNs)	Introduction to Deep Learning and Motivation. Brief introduction of Artificial Neural Networks (ANN), Perceptrons, Multilayer perceptron (MLP), Back propagation training for MLP, Stochastic gradient descent. Applications to some practical classification problems. Hands on: Demonstration and implementation of Shallow and Deep architecture, introduction to Python, Tensorflow and Keras.
2.	Regularization, Hyperparameter Tuning and Autoencoders	Deep Feed forward Networks - Example: Learning XOR, Gradient-Based Learning, Hidden Units. Regularization - drop out, Minibatch gradient descent, RMSProp and Adam optimization. Autoencoders and Their Types Hands on: Hyper parameter tuning and regularization practice, Minibatch gradient descent, Autoencoders
3.	Convolutional Networks	The Convolution Operation, Pooling, Basic architecture of a Convolution Neural Network, Variants of the Basic Convolution Model, Evolution of Convolution NN Architectures - AlexNet, ResNet and other architectures. Hands on : Convolution neural network application using Tensorflow and Keras, Autoencoders using CNN, Building an application for classification and feature extraction.
4.	Sequence Modeling	Recurrent and Recursive Nets - Unfolding Computational Graphs, Recurrent Neural Networks, The Long Short-Term Memory and Other Gated RNNs. Hands on : Language modeling and machine translation, Chatbots.
5	Generative Adversarial Networks, Object Detection Algorithms	GAN and their variants- R-CNN , YOLO and SSD Hands on– Object detection, Realistic Image Generation and face recognition

Principal Coordinator - Academy	Co- Principal Coordinator - Academy	Participating Academies and Local Coordinator Details
Dr. Sanjeev Manhas samanfec@iitr.ac.in M: **7078627392** **IIT Roorkee**	*Prof. Aparajita Ojha* aojha@iiitdmj.ac.in M: 9425800334 **IIITDM Jabalpur**	**IIITDM Jabalpur- Prof. A. Ojha** aojha@iiitdmj.ac.in M: 9425800334
		MNIT Jaipur - *Dr. S. Vipparthi* skvipparthi@mnit.ac.in M: 954 965 8135
		NIT Patna - *Dr. Dr. J P Singh* *Email:* jps@nitp.ac.in *M: 8521159014*
		IIT Roorkee- Dr. Partha Pratim Roy proy.fcs@iitr.ac.in eict@iitr.ac.in *Dr. R. Balasubramanian* balarfma@iitr.ac.in M:7078627392, 01332-286457

Prospective external Experts- (i) Prof. Bijaya Ketan. Panigrahi, IITD (ii) Prof. Ganapati Panda, IIT Bhubaneshwar
Experts from host institutes- (iii) Dr. P. M. Pradhan, IITR (iv) Dr. S. J. Nanda, MNITJ (v) Prof. Rajesh Kumar, MNITJ

Contents of Module of Advancements in Signal Processing and Optimization Techniques

S.No	Module Name	Topics
1.	Adaptive Signal Processing	Fundamentals of Signal Processing, Introduction to Adaptive Systems, Minimum Mean-Square Error, Wiener-Hopf Equation, Error Performance Surface, LMS algorithm, Convergence of weight vector, Learning Curve, Least Mean Square(LMS) Algorithm, Recursive Least Square (RLS) Algorithm, Direct Modelling or System Identification, Inverse Adaptive Modelling (Equalization), Adaptive Noise Cancellation, Adaptive filters for time series and stock market prediction, Biomedical Applications
2.	Applications of Transformations to Signal and	Fourier Transform, Short Time Fourier Transform, Multi-resolution Analysis, Wavelet Transform, Discrete Wavelet Transform (DWT), Sub-band Coding for DWT, DWT for Image processing Applications, Stockwell Transform and its Applications
3.	Classical Optimization and Unsupervised Learning Techniques	Basics of Optimization, Constrained Optimization, Linear Programming, Graphical Method, Dual Problems, Classification and Clustering, K-Means Clustering, Density Based Approaches for Clustering, Applications
4.	Evolutionary and Nature Inspired Optimization Techniques	Introduction to Nature Inspired Optimization, Genetic Algorithms, Particle Swarm Optimization and its variants, Ant Colony Optimization, Honey Bee Optimization, Gray Wolf Optimization, Spider-Monkey Optimization, Social Spider Optimization and their applications.
5.	Multi-Objective Optimization Techniques	Introduction to Multi-Objective Optimization, Non-dominated Sorted Genetic Algorithm (NSGA-II), Multi-Objective Particle Swarm Optimization (MOPSO), Applications.

Principal Coordinator - Academy	Co- Principal Coordinator - Academy	Participating Academies and Local Coordinator Details
Dr. S. J. Nanda sjnanda.ece@mnit.ac.in M: 954 9654 237 **MNIT Jaipur**	*Dr. P. M. Pradhan* pmpradhan.fec@iitr.ac.in eict@iitr.ac.in M: 7078627392 **IIT Roorkee**	**IIITDM Jabalpur -** *Dr. Prabin Padhy* prabin16@iiitdmj.ac.in M:9425155297
		MNIT Jaipur- Dr. S. J. Nanda/ Dr. Rajendra Mitharwal sjnanda.ece@mnit.ac.in M: 954 9654 237
		NIT Patna - Dr. **Ashish Kumar Bhandari** ashish.bhandari@nitp.ac.in M:7485808288 **Dr. Rajeev Arya** rajeev.arya@nitp.ac.in M:813033645
		IIT Roorkee - *Dr. P. M. Pradhan* pmpradhan.fec@iitr.ac.in M: 7078627392
		NIT Warangal - *Dr. J. Ravi Kumar,* ravikumar@nitw.ac.in *M: 8332969363*

Prospective external Experts: (i) Prof. Anshul Kumar, IITD (ii) Debdeep Mukhopadhyay, IITKgp (iii) Prof. P. R. Panda, IITD (iv) Prof. M. Balakrishnan, IITD

Module details of Embedded Systems & Interfacing hands-on

S.No	Module Name	Topics
1.	Embedded Hardware & architecture	Introduction, design characteristics, IO device, ADC/DAC, sensors, actuators, interrupts; ARM architecture fundamentals, ARM instruction set, Thumb set, assembly programming
2.	Interfacing C-Programs with ARM Core Microcontrollers	Bit manipulation, IO port configuration
3.	Processing Elements of an Embedded System	Reconfigurable architectures & FPGAs, ARM and μCs
4.	Embedded OS	how memory is managed, how tasks are scheduled, what interrupts are and how they are handled Linux (monolithic) kernel, micro kernel and modular kernel
5.	Hands-on including-	Build your own input/output system with the ARM Build your own ADC using ARM Learn how to use serial communication using the ARM Create a timer for polling using the ARM

Principal Coordinator Academy	Co- Principal Coordinator - Academy	Participating Academies and Local Coordinator Details		
Prof. Lava Bhargava lavab@mnit.ac.in M: 954 9654 231 **MNIT Jaipur**	*Dr. Bharat Gupta* bharat@nitp.ac.in Mobile:9331406964 **NIT Patna**	**IIT Guwahati -** *Dr. Gaurav Trivedi* trivedi@iitg.ac.in		M: 94355 82802
		IIITDM Jabalpur - *Prof.* **Vijay Kumar Gupta** **vkgupta@iiitdmj.ac.in**		**M: 9425163037**
		MNIT Jaipur - *Dr. A. M. Joshi/Dr. Kuldeep Singh* amjoshi.ece@mnit.ac.in		M: 954 9654 231
		NIT Patna - *Dr. Rajib Kumar Mandal,* *Email:* rajib@nitp.ac.in		*M: 7544006319*
		Dr. Subodh Srivastava *Email:* subodh@nitp.ac.in		*M: 7565036892*

Course 5: Introduction to Programming: A Pedagogical Approach   17th – 22nd June

Prospective Experts: (i) Dr. Amey Karkare, IITK

Module details of Introduction to Programming: A Pedagogical Approach

S.No	Module Name	Topics
1.	Introduction	introduction, Basic Concepts, Familiarize with lab and programming environment
2.	Branching	Branching and Loops Designing programming questions for Branching and Loops
3.	Functions & Recursion	Arrays, Functions, Recursion, Designing programming questions for Arrays, Functions and Recursion
4.	Data structures & algorithms	Simple Data structures and Algorithms Designing programming questions for Data structures and Algorithms
5.	Testing & debugging	Testing, Debugging, and How to Evaluation Student Submissions
	Examples cases	Case studies

Principal Coordinator - Academy	Co- Principal Coordinator - Academy	Participating Academies and Local Coordinator Details
Prof. B. V. Phani bvphani@iitk.ac.in M: 9451423721 L:0512- 6797877 **IIT Kanpur**	--	**IIITDM Jabalpur -** *Dr. Atul Gupta* atul@iiitdmj.ac.in M: 94251 52499 L: 0761-2794223 **MNIT Jaipur- Dr. Dinesh Gopalani** dgopalani.cse@mnit.ac.in **M: 954 9654 392**
		IIT Kanpur - *Dr. Amey Karkare* karkare@cse.iitk.ac.in **M: +91 9532689131** **L: 0512 6797520**
		NIT Patna - *Dr. J. P Singh* jps@nitp.ac.in M: 85211 59014 **Dr. Bharat Gupta**, bharat@nitp.ac.in M:9331406964

6. Robotics & AI   24th -28th June 2019

Prospective external Experts: (i) Prof. S.K. Saha, Professor, IIT Delhi; (ii) Prof.Asish Dutta, Professor, IIT Kanpur; (iii) Dr. Debanik Roy, BARC, Mumbai;
Experts from host institutes- (iv) Prof. Vijay Kumar Gupta, IIITDM Jabalpur(v) Prof. R. B. V. Sabramanyam, NITW

Course Objectives: This course is designed to provide an exposure to the fundamentals of Robotics and Artificial Intelligence. Participants will learn kinematics and dynamics of industrial manipulators, kinematics of mobile robots, trajectory planning, path planning and control and how to embed intelligence in robotic tasks. Hands-on training and practice sessions will help participants gain confidence on robotic concepts, their simulation and implementation including sessions on intelligent agents. The course will be useful for faculty of engineering and sciences who are interested in the learning robotics and intelligent systems.

Contents of Modules of Robotics & AI

S.No.	Module Name	Topics
1.	Introduction to Robotics and Robot Simulators	Introduction to Robotics: Robot Manipulators, Mobile Robots, Legged Robot, Aerial Robots, Applications. Components and mechanisms of a robotic system, sensors and actuators. Introduction to Manipulator, Coordinate System, classification, reachable and dexterous space, Forward and Inverse kinematics, DH Parameter Velocity Kinematics. **Hands on**: Robot Simulation Software, Tutorials on Coordinate systems and Robot Kinematics : Webots, RoboAnalyzer
2.	Kinematics, Dynamics and Control	Mobile robots and their kinematics, Holonomic and Non-holonomic robots. Basics of trajectory planning, configuration space and dimension. Linear and nonlinear robot control: Feedback and motion control, Path Planning and Obstacle Avoidance in known and unknown environment. Intelligence path planning. **Hands on**: Practice on Webots for Trajectory Planning using different types of robots
3.	Artificial Intelligence and Robotics	Introduction to Artificial Intelligence and Machine Learning. Artificial Neural Networks and Fuzzy logic. Vision based planning and control, Learning based motion planning, **Hands on**: Implementation of ANN and Fuzzy logic for motion planning and simulation, Implementing on hardware using Raspberry Pi boards.
5.	More on AI and Machine Learning: Reinforcement Learning	Introduction to Reinforcement Learning, Tabular Solution Methods – Multi-armed Bandits, Finite Markov Decision Processes, Dynamic Programming, Monte Carlo Methods, Temporal Difference Learning.
	Applications, Research Directions and Case Studies	Research directions, and case studies. Mobile robotics – multi-terrain robots, humanoid robots. Biped locomotion; Applications in Agriculture, and Social robotics. Brain Computer Interface (BCI) and gesture control **Hands on**– Simulation of robot tasks and motion planning, Industrial manipulators and motion planning and hardware implementation.

Principal Coordinator - Academy	Support Coordinator - Academy	Participating Academies and Local Coordinator Details
Prof. V. K. Gupta vkgupta@iiitdmj.ac.in 94251 63037 **IITDM Jabalpur**	**Dr. R. B. V. Subramanyam** eict.nitw@gmail.com M: 091210 16547 **NIT Warangal**	**IIT Guwahati -** *Prof. Rohit Sinha* trivedi@iitg.ac.in M: 94355 82802
		IIITDM Jabalpur - *Dr. Prof. VK Gupta* vkgupta @iiitdmj.ac.in *M: 94251 63037*
		MNIT Jaipur - Dr. Arka P. Mazumdar/ Dr. Rahul Chaurasia apmzumdar.cse@mnit.ac.in M:954 9654 8129
		NIT Patna - *Dr. Mukesh Kumar,* mukesh.kumar@nitp.ac.in *M: 8984142557* *Dr. Somaraju Suvvari* somaraju@nitp.ac.in *M: 9676430356*
		IIT Roorkee- Prof. *R. Balasubramanian* balarfma@iitr.ac.in M:7078627392, 01332-286457
		NIT Warangal- Prof RBV Subramanyam, rbvs66@gmail.com M:949 134 6969

Prospective Experts: (i) Prof. Ratnajit Bhattacharjee, IITG (ii) Dr. Satyajit Chakraborty, SAMEER

Contents of Modules of Antenna Trends

S.No.	Module Name	Topics
1.	Antenna Fundamentals and Basic Antenna Configurations	Radiation from short current element; Basic antenna parameters: radiation pattern, directivity, gains radiation resistance; radiation from small loop; linear antennas; monopole antennas; radiation from planar apertures; waveguide and horn antennas *Simulation experiments on: Dipole and loop antenna; Radiated fields from aperture antenna.*
2.	Planar Antennas	Basic microstrip antenna elements: different feeding techniques; transmission line and cavity models; broadband, multiband and compact microstrip antenna elements; PIFA (planar inverted F antenna) *Simulation experiments on: Rectangular and circular microstrip antenna elements, multiband planar antennas, PIFA*
3.	Antenna Arrays and Beamforming	Introduction to antenna arrays, principles of pattern multiplication; uniform one dimensional array: broadside and end-fire arrays; Binomial and Chebyshev arrays; Fixed beamforming networks, switched beam antennas, Adaptive arrays and smart antennas. *Simulation experiments on: uniform one dimensional arrays, switched beam and adaptive antennas*
4.	Reflector antennas for radar and satellite communication	Paraboloidal reflector antennas: axisymmetric and offset, different efficiencies, calculation of radiated field; low cross-polarization feed; High gain dual reflector cassegrain antennas, Examples from radar and satellite communication application. *Simulation experiments on: Paraboloidal axisymmetric and offset reflector antenna*
5.	Emerging trends in antenna technologies	Flexible and Wearable antennas; Implantable antennas; Antennas for 5G, UWB and Terahertz.

Principal Coordinator - Academy	Support Coordinator - Academy	Participating Academies and Local Coordinator Details
Prof. Ratnajit Bhattacharjee ratnajit@iitg.ernet.in M: 09954498116 **IIT Guwahati**	*Dr. Jayanta Ghosh* jghosh@nitp.ac.in M: 7004864544 **NIT Patna**	**IIT Guwahati - Dr. Mahima Arrawatia** mahimaarrawatia@iitg.ac.in M: +91-9462955918 **MNIT Jaipur- Dr. R. K. Maddila/** **Dr. Sarthak Singhal** rkmaddila.ece@mnit.ac.in M: 954 9654 238 **NIT Patna** **Dr. Rajarshi Bhattacharya** rajarshi@nitp.ac.in M:8002898135 **Dr. Manpuran Mahto** mmahto@nitp.ac.in M:7752957828

Prospective external Experts: (i) Dr. Imon Mondal, IITK (ii) Prof. Sachin Patkar, IITB, (iii) Dr. Anand Bulusu, IITR (iv) Dr. H. S. Jatana, SCL (v) Dr. Subhakumar Reddy A., VEDA-IIT; (vi) Industry support- VLSI System Design Corp.

Contents of Modules of VLSI Chip Design Hands on using open source EDA

S.No.	Module Name	Topics
1.	VLSI design, SoC Design	Generic digital design flow, hierarchical design representation, Platform based SoC design
2.	Floorplanning & timing analysis	Floorplanning and pre layout timing analysis [OpenSTA]
3.	Placement, Clock tree synthesis	Partitioning, iterative placement, analytical placement, Wire-length estimation; Clock tree synthesis [MAGIC tool]
4.	Global routing, Detailed routing	Maze routing, line probe algorithms; Left edge, dog-leg, algorithms; Signal integrity, DRC, LVS, ECO; post layout STA [Orouter, MAGIC tool]
5.	Analog and Mixed Signal Circuit Specifications to Design	Important aspects, particular to Analog IC design Flow; Introduction and distinctions between discrete time and continuous time designs; Example design with basics of sampling, effect of noise in sample and hold circuits; Brief introduction and design of OPAMP, and multi-stage OPAMPs.
6.	Analog and Mixed Signal Circuits Layout to GDS	Dealing with frequency compensations, noise and non-linearity in a multi-stage OPAMP; OPAMP offset cancellation techniques; Switched capacitor Circuits Specification to Design

Principal Coordinator - Academy	Co- Principal Coordinator - Academy	Participating Academies and Local Coordinator Details
Prof. Gaurav Trivedi trivedi@iitg.ernet.in M: 9435582802 **IIT Guwahati**	*Dr. C. Periasamy* cpsamy.ece@mnit.ac.in M: 954 965 4 235 **MNIT Jaipur**	**IIT Guwahati -** *Prof. Gaurav Trivedi* trivedi@iitg.ernet.in M: +91-9435582802
		IIITDM Jabalpur - *Prof. P.N. Kondekar* *pnkondekar@iiitdmj.ac.in* M: 9425805445
		MNIT Jaipur- *Dr. Chitrakant Sahu/* *Dr. Menka Yadav* chitrakant.ece@mnit.ac.in M: 954 965 5371
		NIT Patna - *Dr. Sangeeta Singh* *sangeeta.singh@nitp.ac.in* M: 9479646111 *Mr. Pankaj Kumar* *pankajjha@nitp.ac.in* M: 7004727085
		IIT Roorkee- Prof. Sanjeev Manhas eict@iitr.ac.in M: 7078627392, 01332-286457
		NIT Warangal - *Dr. Patri Srihari Rao* *patri@nitw.ac.in* M: 833 2969 357

IIT Roorkee
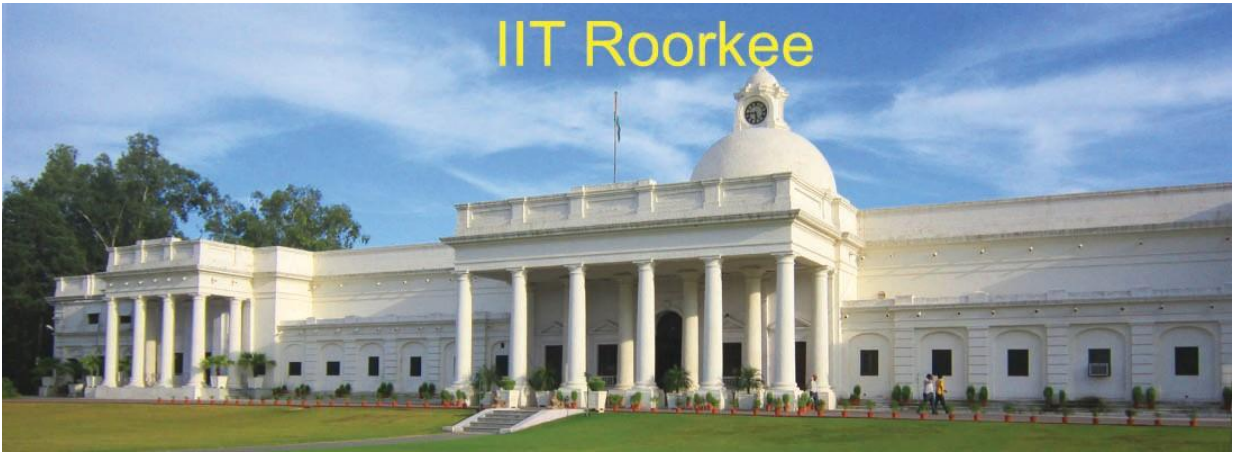
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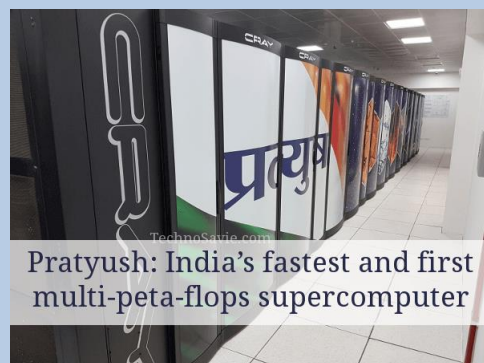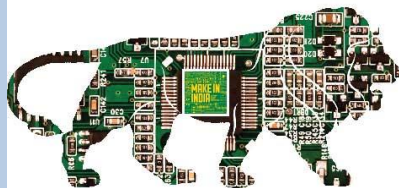
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