



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

NETWORK AUTOMATION								
VII Semester: IT								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AITD24	Core	L	T	P	C	CIA	SEE	Total
		3	0	0	3	40	60	100
Contact Classes: 48	Tutorial Classes: Nil	Practical Classes: Nil			Total Classes: 48			
Prerequisites: There is no prerequisite to take this course								

I. COURSE OVERVIEW:

Network automation is the use of IT controls to supervise and carry out everyday network management functions. It plays a key role in network virtualization technologies and network functions. This course starts by providing an introduction to network automation, SDN, and various applications of network automation, which include integrating DevOps tools to automate the network efficiently and guides through different network automation tasks and covers various data digging and reporting methodologies, such as IPv6 migration, DC relocations, and interface parsing, all the while retaining security and improving data center robustness. It also covers the importance of Ansible for network automation, including best practices in automation, ways to test automated networks using different tools, and other important techniques.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. The fundamental Concepts, introduces how to get started with automation.
- II. How to develop, deploy, and manage automation at production facilities.
- III. How to gather information about network infrastructure configuration and backup.
- IV. Automate specific network administration use cases, including configuration of routers and switches, ports, VLANs, SNMP monitoring, and routing protocols.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:

- CO1 Understand network automation concepts, programming basics and network device configuration using python scripts.
- CO2 Analyze and automate network configurations using device configuration and data parsing techniques
- CO3 Integrate AI and ML techniques for network operation using AI-driven network monitoring systems.
- CO4 Understand how to develop web-based frameworks for automation with the help of back end APIs.
- CO5 Apply continuous integration techniques in network automation to design scalable templates.
- CO6 Understand SDN implementation and programmable network automation using advanced routing.

IV. COURSE CONTENT:

MODULE – I: FUNDAMENTAL CONCEPTS (10)

Network automation: DevOps, Software-defined networking, Open Flow, Program concepts: Variables, Data types, Decision makers, Loops, Arrays, Functions, Best practices, Readability of a program, Support information, Indentation, Sample best practice example

Python Automation for Network Engineers: Technical Requirements, Interacting with network devices, Network device configuration using template.

MODULE – II: ACCESSING AND MINING DATA FROM NETWORK (10)

Device configurations: Multi-vendor environments, IP configs/interface parsing, Device OS upgrades, IPv4 to IPv6 conversion, Site rollouts, Office/DC relocations, Bring Your Own Device (BYOD) configs for switches. Ansible for Network Automation: Ansible overview and terminology, Basic requirements of Ansible, Installation of Ansible, Introduction to ad hoc commands

MODULE – III: WEB FRAMEWORK FOR AUTOMATION TRIGGERS (09)

Using Artificial Intelligence in Operations, Technical requirements, AI in IT operations, Key pillars in AIOps, Data source, Structured data, Non-structured data, Data collector, Data analysis, Machine Learning (ML).

Why create web-based scripts/frameworks?, Understanding and configuring IIS for web framework, Understanding IIS, Configuring IIS for Python script support, Creating web-specific scripts, Accessing a script from dynamic HTML, Creating the backend API in C#, Consuming the API in Python.

MODULE – IV: CONTINUOUS INTEGRATION FOR NETWORK ENGINEERS (09)

Automation examples on various technology domains, BGP and routing table, Configuring Cisco switch port for access point, Configuring Cisco switch port for IP Phone, Wireless LAN (WLAN), Access of IP Address Management (IPAM). Network templates: identifying the number of users the device is going to serve, Step 2 – identifying the right configuration based upon the SKU, Step 3 – identifying the role of the device, Python integration, Chef and Puppet, Chef, Puppet.

MODULE – V: SDN CONCEPTS IN NETWORK AUTOMATION (10)

Managing cloud platforms, Programmable network devices, Controller-based network fabric, Network automation tools. Standardizing configurations on scale Chabot interactions: Use cases, Interacting with SolarWinds, Configuring Open Shortest Path First (OSPF) through Python, Autonomous System Number (ASN) in BGP, Validating the IPv4 and IPv6 addresses

V. TEXTBOOKS:

1. Abhishek Ratan, “Practical-Network-Automation”, Packet Publishing Ltd.,2nd Edition,2018
2. Eric Chou, “Mastering Python Networking: Your one-stop solution to using Python for network automation, programmability, and DevOps”, 3rd Edition, 2018

VI. REFERENCE BOOKS:

1. Jithin Alex , “Network Automation using Python 3”, An Administrator's Handbook, 2018
2. C.Brown, “Python: The Complete Reference”, McGraw Hill, Indian Edition, 2018
3. Jason Edelman, Scott S. Lowe, and Matt Oswalt, “Network Programmability and Automation: Skills for the Next-Generation Network Engineer”, 2017.

VII. WEB REFERENCES

1. <https://davidbombal.com/best-python-books-network-engineers-learn-python-network-automation-ccna-python/>
2. <https://www.redhat.com/en/resources/network-automation-everyone-ebook>
3. <https://www.oreilly.com/library/view/network-programmability-and/9781491931240/>

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Tech talk topics

4. Open-ended experiments
5. Definitions and terminology
6. Assignments
7. Model question paper – I
8. Model question paper – II
9. Lecture notes
10. PowerPoint presentation
11. E-Learning Readiness Videos (ELRV)