



மனோன்மணியம் சுந்தரனார் பல்கலைக்கழகம்  
**MANONMANIAM SUNDARANAR UNIVERSITY**

**SYLLABUS FOR DIPLOMA IN IT INFRASTRUCTURE ADMINISTRATION  
PROGRAM OFFERED THROUGH DIRECTORATE OF VOCATIONAL  
EDUCATION (COMMUNITY COLLEGES AND VOCATIONAL SKILL DEVELOPMENT  
CENTRES) FROM 2019 - 2020**



கல்விசார் நிலைக்குழுக் கூட்டம்

**MEETING OF THE STANDING COMMITTEE ON  
ACADEMIC AFFAIRS HELD ON WEDNESDAY  
THE 22<sup>nd</sup> JANUARY 2020**

**DIPLOMA IN IT INFRASTRUCTURE ADMINISTRATION**  
தகவல் தொழில்நுட்ப உள்கட்டமைப்பு நிருவாகத்தில் பட்டயம்

**SCHEME OF EXAMINATION**

Subject code	Title of the Course	Credit	Hours	Passing Minimum
<b>Semester I</b>				
C19IA11/E19IA01	Computer fundamentals	6	90	40/100
C19IA12/E19IA02	IT Infrastructure Management	6	90	40/100
C19IA13/E19IA03	Remote Infrastructure Management	6	90	40/100
C19CE10/E19CE10	Communicative English	6	90	40/100
C19IAP1/E19IAP1	Practical - I Remote Infrastructure Lab	4	120	40/100
<b>Semester II</b>				
C19IA21/E19IA04	Network Infrastructure Management	6	90	40/100
C19IA22/E19IA05	Data Communication and Networking	6	90	40/100
C19LS23/E19LS05	Life Skill	6	90	40/100
C19IAP2/E19IAP2	Practical II - Network Laboratory	4	120	40/100
C19IAPW/E19IAPW	Project/Internship	10	150	40/100

**Eligibility for admission:** Pass in 10<sup>th</sup>std examination conducted by the Govt. of Tamil Nadu Board of Secondary Education, Government of Tamil Nadu or any other equivalent examination.

**Examination:** Passing Minimum for each Course is 40%. Classification will be done on the basis of percentage marks of the total marks obtained in all the Courses and as given below:

- 40 % but less than 50 % - Third class  
50 % but less than 60 % - Second class  
60 % and above - First class

**Theory Paper**

Internal Marks-25

External Marks-75

## **Syllabus**

### **First Semester:**

- Course I : Computer fundamentals
- Course II : IT Infrastructure Management
- Course III : Remote Infrastructure Management
- Course IV : Communicative English
- Course V : Practical - I Remote Infrastructure Lab

### **Second Semester:**

- Course VI : Network Infrastructure Management
- Course VII : Data Communication and Networking
- Course VIII : Life Skills
- Course IX : Practical II - Network Laboratory
- Course X : Project/Internship

**\*(Semester Pattern for Community College Only)**

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### **Program Objectives**

1. To ensure development of skilled professionals to meet the industrial requirements in Information Technology industry.
2. To empower graduands with skills which will help them establish start-ups in Information Technology and related sectors.
3. To encourage the graduands continue their higher studies and contribute to the needs of the community through research.

**Semester I**  
**Course I**  
(C19IA11/E19IA01)**Computer Fundamentals**

**OBJECTIVE:**

The student should be able to:

- Learn Computer fundamentals
- Be exposed to simple computer networks
- Understand Internet Protocols

**UNIT I COMPUTER FUNDAMENTALS: 18 Hrs**

Block structure of a computer, characteristics, Generations of computers, Classification of computers - capacity, purpose, and generation. Main frame Systems, Desktop Systems – Multiprocessor Systems – Distributed Systems – Real Time systems – Clustered Systems –, Mouse, Monitor (CRT and LCD).

**UNIT II I/O DEVICES AND MEMORY: 18 Hrs**

Keyboard, Light pen, joystick, Mouse, Touch screen, OCR, OMR, Monitors, Printers- Impact, non-impact, Working mechanism: Dot Matrix printer, Inkjet printer and Laser printer. Memory Types: Magnetic core, RAM, ROM, Secondary, Cache, Bubble Memory, Floppy disk, hard disk, compact disk, flash memory, USB, Drives NAND and NOR - tapes.

**UNIT III COMPUTER LANGUAGES: 18 Hrs**

Number System: binary, decimal, hexadecimal, and octal systems, conversion from one system to the other, representation of characters, integers and fractions. Binary Arithmetic: Addition, subtraction and multiplication. Computer languages: Machine language, assembly language, higher level language, 4GL. Introduction to Compiler, Interpreter, Assembler, System Software - Application Software – scripting - Shell script – variables – constructs – example shell scripts.

**UNIT IV COMPUTER NETWORK: 18 Hrs**

Network, Topology, LAN, MAN, WAN, OSI Model, TCP/IP Model, What is RFC, Unicast, multicast, broadcast, NIC, Ports, types, RPC, NTP, Netbios, TCP protocol, Header structure, UDP protocol, Header structure, IP protocol, header structure, IPV4, addressing, CIDR, IP V6, ARP, RARP, ICMP, DHCP, NAT WLAN, Bluetooth, WiFi, WiMesh, WiMaX, (Outline Only)

**UNIT V INTERNET PROTOCOLS & TELECOM NETWORK: 18 Hrs**

Application layer protocols, SMTP, POP, IMAP, MIME, HTTP, HTTPS, RTP, Telnet, FTP, SNMP (Outline Only) DNS, BIND, SLIP, PPP, PPTP, VLAN, VPN, SSL (Outline Only) GSM architecture, GPRS architecture, 3GPP, Mobile TCP, Mobile IP, Handoff, SIP, VOIP

**Reference:**

1. Computers, Larry long & Nancy long, 12th edition Prentice Hall 2005
2. Fred Halsall, Computer networking and the internet, Addison Wesley
3. Larry L. Peterson, Bruce S.Dave, Computer networks, a systems approach, Ed 3, Morgan Kaufmann. 2003
4. Fundamentals of Computers -2014 by Rajaraman V (Author), Adabalan (Author)

**Course II**  
**(C19IA12/E19IA02)IT INFRASTRUCTURE MANAGEMENT**

**OBJECTIVE:**

The student should be able to:

- Understand the Evolutions of Computers
- Be exposed to business and the computing technology
- Learn about security management

**UNIT I INFRASTRUCTURE MANAGEMENT OVERVIEW: 18 Hrs**

Infrastructure management – associated activities - Evolutions of Systems - Mainframes-PCs - Client-server computing - New age systems - ARPANET - Internet - Growth of internet - current business demands - IT systems – return on investments, complexity of today’s computing environment, Total cost of complexity issues, Systems management for business.

**UNIT II PREPARING FOR INFRASTRUCTURE MANAGEMENT: 18 Hrs**

Factors - IT infrastructure design, Customer’s Requirements, Identifying System Components, Existing Processes, Data, applications, Tools - integration, Patterns of IT systems management, Introduction to the design process for information systems, Models, Fundamentals of ITIL-Service delivery process, service support process

**UNIT III BUSINESS CONTINUITY: 18 Hrs**

Principles of Business continuity - Business Interruption Events – Business impact assessment – fire exposure analysis – functional analysis –compliance issues – Pre-Planning - Initial Response - Recovery - Identification of Recovery environment - Identification of Recovery Point - site and structures – Equipment and technology – documents and records electronic equipment and process equipment - Business continuity plans – crisis management plans –function restoration plans – disaster recovery plans – Incident Response Plan

**UNIT IV VIRTUALIZATION: 18 Hrs**

Server virtualization concepts- types of server virtualization technologies – physical partitioning – logical partitioning – host machines – virtual machines – guest operating systems, platforms – Hypervisor –ESX platform –VM kernel – COS – VMFS- ESX architecture

**UNIT V STORAGE AND SECURITY MANAGEMENT: 18 Hrs**

Access Management, Intrusion detection, define, methods of intrusion – SNORT tool - firewall, Information security management system- Introduction to tape Storage, Backup & Restore, Archive & Retrieve, tape library, Disaster Recovery, Database & Application protection, Bare machine recovery, Data retention

**Reference Books:**

1. Foundations of IT service management: based on ITIL - Best practice--IT management - ITSM library, it SMF - the IT Service Management Forum, Van Haren Publishing, 2005, ISBN: 9077212582, 9789077212585
2. IT Infrastructure & its Management, Gupta, Tata McGraw Hill Education, 2010, ISBN: 0070681848, 9780070681842

## Course III

### (C19IA13/E19IA03)REMOTE INFRASTRUCTURE MANAGEMENT

#### OBJECTIVE:

The student should be able to:

- Learn about network management tools
- Be exposed to remote infrastructure management
- Learn about configuration settings and remote monitoring

#### UNIT I

**18 Hrs**

Installation - Capacity Planning Redundancy and Backup Installing the Nagios Software Nagios Server Nagios Plug-ins Configuring Web Server for Nagios - Configuring Your Web Server with an RPM Installation.

#### UNIT II

**18 Hrs**

Nagios: Working principle - Configuration settings - Specifying Configuration Files - Nagios objects - Defining Nagios Configuration Objects - defining host - Services - templates - contact objects - group objects - time periods - commands

#### UNIT III

**18 Hrs**

General security guidelines - Web console security - Nagios administration - using the web console - Monitoring hosts and services - tactical monitoring - reporting - Remote monitoring - NRPE - SSH.

#### UNIT IV

**18 Hrs**

Advanced commands Macros - event handlers - notifications - External commands - host and services dependencies - Notification escalations - Distributed monitoring, redundancy and failover - Integrating nagios - SNORT MRTG Cacti and other tools

#### UNIT V

**18 Hrs**

Simple Network Management Protocol, Management Information Base, types, structure - RMON, - SNMP walk - tools - OpenNMS - Installation, configuration, types of files, Add, modify, delete, nodes, report generations - Dashboards.

#### Reference Books:

1. Remote Infrastructure Management, Lambert M Surhone, Mariam T Tennoe, Susan F Henssonow, VDM Publishing, 2010, ISBN: 6132472282, 9786132472281
2. SNMP, SNMPv2, SNMPv3, and RMON 1 & 2, Williams Stallings, Addison Wesley, 2013, ISBN: 0321952022, 97803219520283.
3. Pro Nagios 2.0, Books for professionals by professionals Expert's Voice in Open Source, James Turnbull, Apress, 2006, ISBN 1430201533, 9781430201533

**Course IV**  
**(C19CE10/E19CE10) COMMUNICATIVE ENGLISH**

1. **Basic Grammar:**
  - a. Review of grammar
  - b. Remedial study of grammar
  - c. Simple sentence
  - d. Word passive voice etc.
2. **Bubbling Vocabulary:**
  - a. Synonyms
  - b. Antonyms
  - c. One – work Institution
3. **Reading and Understanding English**
  - a. Comprehension passage
  - b. Précis – writing
  - c. Developing a story from hints.
4. **Writing English**
  - a. Writing Business letters.
  - b. Paragraph writing
  - c. Essay writing
  - d. Dialogue writing
5. **Speaking English**
  - a. Expressions used under different circumstances
  - b. Phonetics

- Reference :**
1. V.H.Baskaran – “English Made Easy”
  2. V.H.Baskaran – “English Composition Made Easy”  
(Shakespeare Institute of English Studies, Chennai)
  3. N.Krishnaswamy – “Teaching English Grammar”  
(T.R.Publication, Chennai)
  4. “Life Skill” – P.Ravi, S.Prabakar and T.Tamzil Chelvam,  
M.S.University, Tirunelveli.

**Course V  
Practical I**

**(C19IAP1/E19IAP1)REMOTE INFRASTRUCTURE LAB**

Lab experiments may kindly be designed based on the guidelines given below:

1. Install Nagios
2. List out the various configuration file locations
3. Configure Nagios
4. Configure SNMP for network elements and capture them in Nagios
5. Create users and groups
6. Create objects
7. Create network views
8. Create reports
9. Create automated reports
10. Install Open nms
11. List out the various configuration locations
12. Configure Open NMS



## SEMESTER II Course VI

### (C19IA21/E19IA04)NETWORK INFRASTRUCTURE MANAGEMENT

#### **OBJECTIVE:**

The student should be able to:

- Learn Linux based administration
- Be exposed to storage and security management
- Learn windows platform management

#### **UNIT I**

**18 Hrs**

**INFRASTRUCTURE MANAGEMENT OVERVIEW:** Definitions, Infrastructure management activities, Evolutions of Systems since 1960s and their management, growth of internet, current business demands and IT systems issues, complexity of today's computing environment, Total cost of complexity issues, and Value of Systems management for business.

#### **UNIT II**

**18 Hrs**

**LINUX ADMINISTRATION:** Overview Foss- Definition of FOSS, Advantages of Foss, trends and potential— GNU/Linux OS installation-detect hardware, configure disk partitions & file systems - install a GNU/Linux distribution; command line, Basic shell commands - logging in, listing files, editing files, copying/moving files, viewing file contents, changing file modes and permissions,-file ownerships and permissions, process management; Administrating users and groups-install and configure local components and services Establishing network and securing network services, Deploying file-sharing services. GUI-based tools - key command-line concepts. Basic security skill, Basic Server Admin-Managing physical storage

#### **UNIT-III**

**18 Hrs**

**STORAGE MANAGEMENT:** Introduction to Storage, types of storage – file storage Vs block storage – RAID and types - Storage virtualization using RAID and different RAID levels - disk error management- raid error management - Backup & Restore, storage synchronization and tools – HA solution – Rack Space – Management - open source tools - introduction to distributed storage - large storage systems – Amazon cloud

#### **UNIT IV**

**18 Hrs**

**SECURITY MANAGEMENT:** Introduction Security, CIA triad – digital Identity management, Access Management, concepts of Single sign-on, LDAP fundamentals – configuring LDAP - Kerberos fundamentals – LDAP Vs Kerberos

#### **UNIT V**

**18 Hrs**

**WINDOWS:** Windows platform administration - Windows server - Active directory – domain services – management console – trees – forest – trust domains - administration tools – OU, user object, group object, computer object, DS query, DNS

#### **References:**

1. Pro Linux System Administration: Learn to Build Systems for Your Business Using Free and Open Source Software Dennis Matotek, James Turnbull, Peter Lieverdink, 2<sup>nd</sup> Edn., Apress, 2017, ISBN: 1484220080, 9781484220085
2. Network Infrastructure Security, Angus Wong, Alan Yeung, Springer Science & Business Media, 2009, ISBN: 1441901663, 9781441901668

## Course VII

### (C19IA22/E19IA05)Data Communication and Networking

#### **OBJECTIVE:**

The student should be able to:

- Learn the basics of Computer networking
- Be exposed to categories of networking
- Learn in detail the physical layers of Computer networks

#### **UNIT I**

**18 Hrs**

**INTRODUCTION:** Network Hardware, Topology, Network Software, Reference Models, Example Networks.

#### **UNIT II**

**18 Hrs**

Uses of Computer Networks, ARPANET, Connection Oriented Networks, X.25, Frame Relay, ATM

#### **UNIT III**

**18 Hrs**

**PHYSICAL LAYER:** The Theoretical Basis for Data Communication, The Public Switched Telephone Network, The Mobile Telephone System

#### **UNIT IV**

**18 Hrs**

**DATA LINK LAYER:** Data Link Layer Design Issues, Error Detection and Correction, Elementary Data Link Protocols, Sliding Window Protocols, Example Data Link Protocols

#### **UNIT V**

**18 Hrs**

**MEDIUM ACCESS CONTROL SUB LAYER:** The Channel Allocation Problem, Multiple Access Protocols, Ethernet, Wireless LANs, Broadband Wireless, Bluetooth, RFID, Data Link Layer Switching

#### **Text Book:**

- Data Communications and Networking, Behrouz A. Forouzan, Sophia Chung Fegan, Huga Media, 2007, ISBN: 0072967757, 9780072967753

## Course VIII

### (C19LS23/E19LS05)Life Skill

#### I Life Coping or adjustment

- (a) External and internal influence in one's life
- (b) Process of coping or adjustment
- (c) Coping with physical change and sexuality
- (d) Coping with stress, shyness, fear, anger far live and criticism.

#### II Attitude

- (a) Attitude
- (b) Self acceptance, self – esteem and self actualization
- (c) Positive thinking

#### III Problem Solving

- (a) Goal Setting
- (b) Decision Making
- (c) Time Management and stress Management.

#### IV Computers

- (a) Introduction to Computers
- (b) M.S.Office
- (c) Power Point

#### V Internet

- (a) Introduction to internet
- (b) E – mail
- (c) Browsing

#### References:

- 1) Life Skill Programme course I & II by Dr. Xavier Alphona MCRDCE Publications. R.K.Mutt Road, Chennai – 28
- 2) ஆளுமை பண்பு வளர்த்தல் மற்றும் தகவல் தொடர்பு by M.Selvaraj Community College,Palayamkottai
- 3) “Life Skill” –P.Ravi, S.Prabahar & T.Tamil Chelvam, M.S. University, Tirunelveli

**Course IX**  
**Practical II**

(C19IAP2/E19IAP2) **NETWORK LABORATORY**

Network The following exercises should be done preferably on 'UNIX'/linux platform

1.
  - (a) Configure the IP addressing and subnetting on a LAN using 'ifconfig'
  - (b) Check the basic IP connectivity using 'ping' command.
  - (c) Inspect the Routing table and ARPcache of a LAN server.
  - (d) Use 'traceroute' to watch the route your IP packet takes for reaching destination.
  - (e) Use 'tcpdump' to monitor 'ping' and 'traceroute' from your machine.
  
2.
  - (a) Create a user group and permit it to access 'Telnet' service over a LAN.
  - (b) Restrict the 'Telnet' service to maximum five users at a time.
  - (c) Configure the 'Cron' daemon to stop 'Telnet' service and reboot the system after five minutes of usage by at least three users.
  
3.
  - (a) Create a text file containing records of employees in text form line wise.
  - (b) Save this file and edit its copy for some changes and save it.
  - (c) Use 'diff' command to generate a patch for the original file.
  - (d) Use the 'patch' command to patch the original file to make it similar to the edited copy.
  
4.
  - (a) Create a text file containing records of employees in text form line wise.
  - (b) Save this file and edit its two copies independent of each other.
  - (c) Save both new versions as two new files.
  - (d) Now use 'diff3' command to compare and create a third file containing merged output.
  - (e) Again create the merged file using '-m' option of the 'diff3' command.
  
5.
  - (a) Create a text file containing records of employees in text form line wise and save it.
  - (b) Establish the 'CVS' repository over a network and store the original file in it.
  - (c) Now edit the file and save its edited version in the repository.
  - (d) Store at least five continuously edited versions of the file in the 'CVS' repository.
  - (e) Now retrieve version 1.0 and 3.0 from the repository.

6.
  - (a) Use 'tar' to create multi-file non-zipped and zipped archives (using gzip and bzip2).
  - (b) Update the non-zipped tarball by adding three new files to it and list its final contents.
  - (c) Now extract the contents of both the tarballs to two different directories.
  - (d) Inspect the retention of user permissions on the files before the archiving & after the extraction.
7.
  - (a) Use LDAP to access 'Telnet' service on a LAN server.
  - (b) Use /etc/hosts.allow and /etc/hosts.deny to allow & deny access to web service to two hosts on the LAN.
  - (c) Use 'iptables' or similar utility to block TCP SYN segments from a particular IP address for port 25 using firewall rules.
  - (d) Use an IDS tool (e.g. tripwire, snort, other firewall) to track changes in /var/log/messages after every 5 minutes and to monitor the ICMP requests coming to the host.
8.
  - (a) Use the Netstat command and collect the traffic statistics.
  - (b) Identify the various live connections present in the network
9. Configure SNMP and SNMP agents for the system and other elements with admin rights.
10. Write a shell script that takes a valid directory name as an argument and recursively descend all the sub-directories, finds the maximum length of any file in that hierarchy and writes this maximum value to the standard output. Write a shell script that accepts a path name and creates all the components in that path name as directories. For example, if the script is named mpc, then the command mpc a/b/c/d should create directories a, a/b, a/b/c, a/b/c/d.

## **Course X**

### **(C19IAPW/E19IAPW)PROJECT/INTERNSHIP**

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