

Syllabus for CCTV System Installation and Service Technician

Course Name	CCTV System Installation and Service Technician
Sector	Electronics & Hardware
Course Code	ELE/2023/CCTV/194
Level	4
Occupation	Security System Technician
Job Description	The individual's role involves the installation and maintenance of CCTV systems at customer sites, encompassing an understanding of customer and site specifications, camera installation, and seamless hardware integration to ensure the optimal functioning of the CCTV surveillance setup.
Course Duration	Total Duration 540 Hrs (T-90, P-240, OJT-150, ES-60)
Trainees' Entry Qualification	12th grade pass OR Completed 2nd year of 3-year diploma (after 10th) and pursuing regular diploma OR 10th grade pass plus 2-year NTC in Mason Trade OR 10th grade pass and pursuing continuous schooling OR 10th Grade Pass with 2 yrs relevant experience OR Previous relevant Qualification of Level 3.0 or equivalent with minimum education as 8th Grade pass OR Previous relevant Qualification of Level 3.5 or Equivalent
Trainers Qualification	BE/BTECH IN ELECTRONICS/COMPUTER SCIENCE/IT/ELECTRICAL/ELECTRICAL AND ELECTRONICS, DIPLOMA IN ELECTRONICS/COMPUTERS/IT/ELECTRICAL/ELECTRICAL AND ELECTRONICS, ITI IN ELECTRONICS MECHANIC TRADE /ITI IN INSTRUMENT MECHANIC TRADE /BSC 2 YEARS FOR B.E./B.TECH. / 3 YEARS FOR DIPLOMA / 5 YEARS FOR ITI,BSC

Structure of Course:

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
1	Basics of Security Surveillance	Explain importance of Security surveillance system along with different types and nodes of it.	10	20	30
2	Types of Camera & their functions	Demonstrate different types of CCTV camera, their functions, special application of Pan-Tilt-Zoom camera, pixel requirement	10	20	30
3	Lens & sensors	Use different types of lenses and sensors in a CCTV camera and their functions	10	20	30
4	Digital Video Recorder (DVR)	Demonstrate function, features and use of various types of DVR in CCTV surveillance system	10	20	30
5	Principles of Remote Accessing	Explain networking, OSI architecture and IP addressing, the process of remote access to a DVR	10	20	30
6	Cables	Demonstrate the use of various types of cables used in CCTV surveillance system, connectors of Co-axial, Twisted pair(UTP & STP) and Siamese cable	10	20	30
7	Survey, planning, installation & maintenance of CCTV surveillance system	Demonstrate site survey and installation process, post installation checking, maintenance and servicing methodology	10	50	60
8	Setup of surveillance system	Demonstrate the process of setting up a DVR, setting up the angle of camera, setting up of alarm, motion detection, recordings and backup	15	45	60

Module No.	Module name	Outcome	Theory (Hrs)	Practical (Hrs)	Total (Hrs) [Multiple of 30]
9	Safe Working Practices	Work effectively at workplace following safe and ethical working practices and good customer relationship.	10	20	30
10	OJT	Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	--	150	150
11	Employability Skill	As per NCVET guided curriculum	60	--	60
TOTAL:			150	390	540

SYLLABUS:

Module No. 1: Basics of Security Surveillance

Outcome: Explain importance of Security surveillance system along with different types and nodes of it.

Theory Content:

- 1.1 Explain surveillance system.
- 1.2 Explain the importance and use of video surveillance system, advantages and disadvantages of use of surveillance system.
- 1.3 Describe the types of video surveillance system and the generations of surveillance system.
- 1.4 Explain proper use of tools and equipment used in surveillance system.

Practical Content:

- 1.1 Identification of different types of tools and equipment used in video surveillance system.
- 1.2 Show the use of tools for which purpose they are used.
- 1.3 Show the use of different types of equipment for which purpose they are used.

Tools & Equipment needed:

Pliers, crimping tool, line tester, wire and cable cutter and stripper, industrial knife, CCTV cameras, DVR, SMPS, Monitor, exercise book, pen, white board, duster etc.

Module No. 2: Types of Camera & their functions

Outcome: Demonstrate different types of CCTV camera, their functions, special application of Pan-Tilt-Zoom camera, pixel requirement.

Theory Content:

- 2.1 Describe CCTV camera and different types of CCTV camera used in CCTV surveillance system e.g. Dome Camera - Bullet Type Camera - Infrared/Night Vision CCTV Camera etc.
- 2.2 Explain the purpose of use of different types of cameras and their functions.
- 2.3 Application of different types of cameras and special application of Pan-Tilt-Zoom camera.
- 2.4 State the voltage and power requirement for different types of cameras.
- 2.5 State different types of CCTV camera available in the market, their specifications and prices.

Practical Content:

- 2.1 Show how to identify the cameras.
- 2.2 Show different parts of a camera and the functions of each part.
- 2.3 Show how to disassemble and assemble a camera.
- 2.4 Show IR LED and LDR used in the IR cameras.

Tools & Equipment needed:

Different types of cameras i.e. Dome camera, Bullet camera, IR camera etc., screw driver set, exercise book, pen, white board, duster.

Module No. 3: Lens & sensors

Outcome: Use different types of lenses and sensors in a CCTV camera and their functions

Theory Content:

- 3.1 Explain different types of lenses used in the CCTV cameras and their functions.
- 3.2 Demonstrate different types of sensors used in the CCTV cameras and working principle of them.
- 3.3 State different types of lenses and sensors available in the market, their specifications and prices.

Practical Content:

- 3.1 Show different types of lenses used in CCTV cameras and identify them.
- 3.2 Show different types of sensors used in CCTV cameras and identify them.
- 3.3 Show how the lenses and sensors work in a camera.

Tools & Equipment needed:

Lenses and sensors, exercise book, pen, white board, duster.

Module No. 4: Digital Video Recorder (DVR)

Outcome: Demonstrate function, features and use of various types of DVR in CCTV surveillance system

Theory Content:

- 4.1 Demonstrate digital video recorder and explain different types of DVR and their purposes.
- 4.2 Explain the function and working principle of a DVR.
- 4.3 Explain the features and blocks of different types of DVR.
- 4.4 State the voltage and power requirement for different types of DVRs
- 4.5 Discuss different types of DVR available in the market, their specifications and prices.

Practical Content:

- 4.1 Show different types of digital video recorders and their parts.
- 4.2 Show how to identify the DVRs depending on the number of channels.
- 4.3 Show how to connect a storage device with a DVR.
- 4.4 Show the input and output ports of DVR .

Tools & Equipment needed:

Digital video recorders, screw driver set, exercise book, pen, white board, duster etc.

Module No. 5: Principles of Remote Accessing

Outcome: Explain networking, OSI architecture and IP addressing, the process of remote access to a DVR

Theory Content:

- 5.1 Explain basics of networking and different types of networks.
- 5.2 Discuss IP technology and networking principles.
- 5.3 Explain OSI model architecture and the different layers and data processing responsibility of each layer.
- 5.4 Explain the process of remote access to a DVR.

Practical Content:

- 5.1 Demonstrate the process of installing the appropriate software for IP network or remote monitoring.
- 5.2 Show how to connect the DVR to router and how to enable remote monitoring.
- 5.3 Show how to perform viewing, recording and replaying the video while remote accessing.

Tools & Equipment needed:

DVR, router, network cable, exercise book, pen, white board, duster etc.

Module No. 6: Cables

Outcome: Demonstrate the use of various types of cables used in CCTV surveillance system, connectors of Co-axial, Twisted pair(UTP & STP) and Siamese cable

Theory Content:

- 6.1 Explain different types of cable used in CCTV system installation and their connectors.
- 6.2 List different types of cables used for data transmission and power transmission.
- 6.3 Discuss different types of cables available in the market with their specifications and prices.
- 6.4 Discuss how to check the cables with specified thickness to connect with CCTV system.

Practical Content:

- 6.1 Show different types of cables used in CCTV system and their connectors.
- 6.2 Show how to use BNC connectors for joining cables and crimp them.
- 6.3 Show how to use power cables of specified thickness to connect CCTV system with power supply.
- 6.4 Show how to check the continuity of the cable after connecting with the connectors.
- 6.5 Show how to lay the cables in the building or site to connect the cameras and system.

Tools & Equipment needed:

Different types of cables, digital multimeter, LAN tester, Pliers, Crimping tool, cable jacket stripper, industrial knife, line tester, exercise book, pen, white board, duster etc.

Module No. 7: Survey, planning, installation & maintenance of CCTV surveillance system

Outcome: Demonstrate site survey and installation process, post installation checking, maintenance and servicing methodology

Theory Content:

- 7.1 Explain the importance of visiting site, interacting with customer and understand the customer requirements.
- 7.2 Discuss the role and responsibilities of a technician.
- 7.3 Explain the importance of deciding the CCTV system to be installed and describe the process of preparation of field and site for camera installation.
- 7.4 Explain various elements of CCTV system such as camera, DVR, monitor etc.
- 7.5 Discuss the process of post installation checking and maintenance methodology.
- 7.6 Explain the importance of achieving productivity and quality standards.

Practical Content:

- 7.1 Roleplay how to greet the customer and listen to their requirements.

- 7.2 Roleplay how to ask open and close ended questions to understand the customer requirement and expectation about the CCTV system.
- 7.3 Show how to check the hardware equipment before taking to the installation site.
- 7.4 Demonstrate the process of connecting all the cables from multiple cameras to the CCTV system area and show how to connect the power and video output cables to the camera.
- 7.5 Show how to connect the cameras with the DVR and how to connect the monitor with the video output connections in the DVR.
- 7.6 Demonstrate the use of tools such as diagonal cutter, screw drivers, crimping tools, knife etc. for cabling and camera mounting
- 7.7 Demonstrate how to perform a demo after completing the installation with the customer.
- 7.8 Show the process of servicing of a faulty CCTV camera

Tools & Equipment needed:

Digital video recorders, cameras, monitor, cables, adapters, Drilling equipment, Ladder, customer application form, feedback form, diagonal cutter, industrial knife, screw drivers, crimping tools, safety tools, exercise book, pen, white board, duster, etc.

Module No. 8: Setup of surveillance system

Outcome: Demonstrate the process of setting up a DVR, setting up the angle of camera, setting up of alarm, motion detection, recordings and backup

Theory Content:

- 8.1 State various specifications and the procedure to be followed for setting up the system.
- 8.2 Explain the controls of different options in camera such as rotation, speed of movement in pan-tilt-zoom camera.
- 8.3 Demonstrate the process of setting up the angle of camera.
- 8.4 Explain the video recording technologies and video recording of footage.
- 8.5 Explain the viewing, recording, replaying and backup functions in the system.

Practical Content:

- 8.1 Demonstrate how to inspect and check the installed CCTV equipment to confirm operational effectiveness.
- 8.2 Show how to set camera controls and demonstrate the process of setting up the type of camera such as pan, tilt, zoom unit as per customer requirement.
- 8.3 Show how to operate the system and other hardware.
- 8.4 Demonstrate how to perform viewing, recording and replaying the video captured in the system as per customer requirement.
- 8.5 Show the process of setting up of alarm, motion detection etc.
- 8.6 Show how to record the footage and take backup of the recorded footage.

Tools & Equipment needed:

Digital video recorders, cameras, monitor, cables, storage device, adapters, mouse, etc

Module No. 9: Safe Working Practices

Outcome: Work effectively at workplace following safe and ethical working practices and good customer relationship.

Theory Content:

- 9.1 State the importance of work ethics and workplace etiquette.
- 9.2 Study & discuss the common reasons for interpersonal conflict and ways of managing them effectively. And the importance of following organizational guidelines for dress code, time schedules, language usage and other behavioural aspects.
- 9.3 Explain the common workplace guidelines and legal requirements on non-disclosure and confidentiality of business-sensitive information.
- 9.4 Describe the concept of waste management and methods of disposing hazardous waste.
- 9.5 Explain various warning and safety signs & describe different ways of preventing accidents at the workplace.
- 9.6 Explain the organizational safety procedures for maintaining electrical safety, handling tools and hazardous materials

Practical Content:

- 9.1 Develop a sample plan to achieve organisational goals and targets.
- 9.2 Role-play to demonstrate the use of professional language and behaviour that is respectful to all genders.
- 9.3 Apply organizational protocol on data confidentiality and sharing only with the authorized personnel.
- 9.4 Demonstrate the use of protective equipment suitable as per tasks and work conditions.
- 9.5 Prepare a report to inform the relevant authorities about any abnormal situation/behaviour of any equipment/system.
- 9.6 Demonstrate the steps to free a person from electrocution safely.
- 9.7 Demonstrate the application of defined emergency procedures such as raising alarm, moving injured people, etc.

Tools & Equipment needed:

Sample of Escalation Matrix, Organization Structure, Personal Protection Equipment, Safety Cotton Gloves, Safety Footwear, Warning Signs and Tape, First Aid Kit.

Module No. 10: OJT

Outcome:

Work in real job situation with special emphasis on basic safety and hazards in this domain

Practical Content:

Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for **150 Hours**.)

Module No. 11 : Employability Skills

Key Learning Outcomes

Introduction to Employability Skills

Duration: 1.5 Hours

1. Discuss the Employability Skills required for jobs in various industries
2. List different learning and employability related GOI and private portals and their usage

Constitutional values - Citizenship

Duration: 1.5 Hours

3. Explain the constitutional values, including civic rights and duties, citizenship, responsibility towards society and personal values and ethics such as honesty, integrity, caring and respecting others that are required to become a responsible citizen
4. Show how to practice different environmentally sustainable practices.

Becoming a Professional in the 21st Century

Duration: 2.5 Hours

5. Discuss importance of relevant 21st century skills.
6. Exhibit 21st century skills like Self-Awareness, Behavior Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn etc. in personal or professional life.
7. Describe the benefits of continuous learning.

Basic English Skills

Duration: 10 Hours

8. Show how to use basic English sentences for everyday conversation in different contexts, in person and over the telephone
9. Read and interpret text written in basic English
10. Write a short note/paragraph / letter/e -mail using basic English

Career Development & Goal Setting

Duration: 2 Hours

11. Create a career development plan with well-defined short- and long-term goals

Communication Skills

Duration: 5 Hours

12. Demonstrate how to communicate effectively using verbal and nonverbal communication etiquette.
13. Explain the importance of active listening for effective communication
14. Discuss the significance of working collaboratively with others in a team

Diversity & Inclusion

Duration: 2.5 Hours

15. Demonstrate how to behave, communicate, and conduct oneself appropriately with all genders and PwD
16. Discuss the significance of escalating sexual harassment issues as per POSH act.

Financial and Legal Literacy

Duration: 5 Hours

17. Outline the importance of selecting the right financial institution, product, and service
18. Demonstrate how to carry out offline and online financial transactions, safely and securely
19. List the common components of salary and compute income, expenditure, taxes, investments etc.
20. Discuss the legal rights, laws, and aids

Essential Digital Skills

Duration: 10 Hours

21. Describe the role of digital technology in today's life
22. Demonstrate how to operate digital devices and use the associated applications and features, safely and securely
23. Discuss the significance of displaying responsible online behavior while browsing, using various social media platforms, e-mails, etc., safely and securely
24. Create sample word documents, excel sheets and presentations using basic features
25. utilize virtual collaboration tools to work effectively

Entrepreneurship

Duration: 7 Hours

26. Explain the types of entrepreneurship and enterprises
27. Discuss how to identify opportunities for potential business, sources of funding and associated financial and legal risks with its mitigation plan
28. Describe the 4Ps of Marketing-Product, Price, Place and Promotion and apply them as per requirement
29. Create a sample business plan, for the selected business opportunity

Customer Service

Duration: 5 Hours

30. Describe the significance of analyzing different types and needs of customers
31. Explain the significance of identifying customer needs and responding to them in a professional manner.
32. Discuss the significance of maintaining hygiene and dressing appropriately

Getting Ready for apprenticeship & Jobs

Duration: 8 Hours

33. Create a professional Curriculum Vitae (CV)
34. Use various offline and online job search sources such as employment exchanges, recruitment agencies, and job portals respectively
35. Discuss the significance of maintaining hygiene and confidence during an interview
36. Perform a mock interview
37. List the steps for searching and registering for apprenticeship opportunities

Learning Outcome – Assessment Criteria

Module No.	Learning Outcome	Assessment Criteria
1	Explain importance of Security surveillance system along with different types and nodes of it.	<p>After completion of this module students will be able to:</p> <p>1.1 Describe surveillance system</p> <p>1.2 Explain the importance of video surveillance system</p> <p>1.3 Identify and select various types of surveillance system</p> <p>1.4 Identify and select various types of tools and equipment with proper applications.</p>
2	Demonstrate different types of CCTV camera, their functions, special application of Pan-Tilt-Zoom camera, pixel requirement	<p>After completion of this module students will be able to:</p> <p>2.1 Identify and select various CCTV cameras</p> <p>2.2 Describe the purpose, functions of cameras</p> <p>2.3 List the price and specifications of cameras available in the market</p> <p>2.4 Recognize the power requirement of the cameras</p> <p>2.5 Demonstrate disassemble and assemble in a camera.</p>
3	Use different types of lenses and sensors in a CCTV camera and their functions	<p>After completion of this module students will be able to:</p> <p>3.1 Identify and select different types of lenses and sensors</p> <p>3.2 Describe different types of sensors used in CCTV</p> <p>3.3 Describe working principle of sensors and lenses.</p> <p>3.4 Recognize the lenses and sensors available in the market with their specifications and prices</p>

Module No.	Learning Outcome	Assessment Criteria
4	Demonstrate function, features and use of various types of DVR in CCTV surveillance system	<p>After completion of this module students will be able to:</p> <p>4.1 Identify and select different types of DVRs.</p> <p>4.2 Describe the working principle, functions and power requirement of DVR</p> <p>4.3 Identify the different types of DVRs depending on the number of channels.</p> <p>4.4 Explain the procedure to connect the DVR with HDD</p> <p>4.5 Identify different types of DVR available in market with the specifications and price</p>
5	Explain networking, OSI architecture and IP addressing, the process of remote access to a DVR	<p>After completion of this module students will be able to:</p> <p>5.1 Describe the basics of networking</p> <p>5.2 Explain IP technologies and OSI architecture</p> <p>5.3 Demonstrate the process of remote access to a DVR</p> <p>5.4 Demonstrate the installation procedure of software for the IP network or remote monitoring.</p> <p>5.5 Exhibit the procedure to connect the DVR to router to enable remote monitoring.</p> <p>5.6 Demonstrate the procedure to record and viewing and replay the video while remote accessing.</p>
6	Demonstrate the use of various types of cables used in CCTV surveillance system, connectors of Co-axial, Twisted pair(UTP & STP) and Siamese cable	<p>After completion of this module students will be able to:</p> <p>6.1 Identify and select different types of cables and connectors</p> <p>6.2 Exhibit different types of cables available in the market with their specifications and prices.</p> <p>6.3 Demonstrate the process to connect cables with the specific connectors</p> <p>6.4 Perform continuity checking of the cable after connecting with the connectors</p> <p>6.5 Demonstrate the procedure lay the cables in the building or site to connect the cameras and system</p>
7	Demonstrate site survey and installation process, post installation checking, maintenance and servicing methodology	<p>After completion of this module students will be able to:</p> <p>7.1 Explain the importance of site visit, customer requirements</p> <p>7.2 Identify the elements of CCTV system</p> <p>7.3 Demonstrate the process to connect DVR with the cameras and monitor.</p> <p>7.4 Explain the procedure to check the hardware</p>

Module No.	Learning Outcome	Assessment Criteria
		<p>equipment before taking to the installation site</p> <p>7.5 Demonstrate the process of post-installation check and maintenance.</p> <p>7.6 Identify, test and troubleshoot the faulty CCTV camera.</p>
8	<p>Demonstrate the process of setting up a DVR, setting up the angle of camera, setting up of alarm, motion detection, recordings and backup</p>	<p>After completion of this module students will be able to:</p> <p>8.1 Describe various specifications and procedure to be followed for setting up the system.</p> <p>8.2 Demonstrate the process of camera controls</p> <p>8.3 Perform the process of setting up of alarm, motion, recording and backup</p> <p>8.4 Describe different functions such as viewing, recording, replaying of the captured video</p>
9	<p>Work effectively at workplace following safe and ethical working practices and good customer relationship.</p>	<p>After completion of this module students will be able to:</p> <p>9.1 Explain the importance of work ethics and workplace etiquette.</p> <p>9.2 Describe the common reasons for interpersonal conflict and way to manage them.</p> <p>9.3 Follow the common workplace guidelines and legal requirements on non-disclosure and confidentiality of business sensitive information.</p> <p>9.4 Describe the concept of waste management and methods of disposing hazardous waste.</p> <p>9.5 Develop a sample plan to achieve organisational goal.</p> <p>9.6 Apply safe working practices.</p> <p>9.7 Demonstrate the uses of PPE</p> <p>9.8 Demonstrate the procedure for emergency situation viz. electrocution etc and application of raising alarm, moving injured people etc.</p>
10	OJT	<p>Assessor will check report prepared for this component of Practical training of the course and assess whether competency has been developed to work in the real job situation with special emphasis on basic safety and hazards in this domain. (The trainee is expected to undertake work in actual workplace under any supervisor / contractor for 150 Hours.)</p>
11	Employability Skill	As per NCVET guided curriculum

List of Tools, Equipment & materials needed for 30 Trainees (Practical)

Sl No	Items Name	Specification	Qty
1	Wire Stripper	Standard	5
2	Wire Cutter	Standard	5
3	Screw Driver Set	Standard	5
4	PC	Standard	1
5	Paper Cutter/Knife	Standard	5
6	Nose Pliers	Standard	5
7	Line Tester	Standard	5
8	LCD Monitor	Standard	2
9	LAN Tester	Standard	2
10	Insulation Tape	Standard	5
11	Hard Disk	Standard	2
12	Hammer	Standard	5
13	Electrician Plier	Standard	5
14	Electrical Drill	Standard	2
15	Drill Bit Set	Standard	2
16	Digital Video Recorder	4 Channel and 8 Channel	2
17	Digital Multimeter	Standard	2
18	DC Connector	For Power Cable	20
19	Crimping Tool	Standard	5
20	Connectors	BNC Connectors	20
21	CCTV Camera	Vandal Proof	4
22	CCTV Camera	IP Camera-Dome	3
23	CCTV Camera	IR Bullet	5
24	CCTV Camera	IR Dome (Analog)	5
25	Cable	CAT-5(in metre)	50
26	Cable	2 core power cable (in metre)	50
27	Cable	RG-6 Video Cable (in metre)	50
28	Allen Key Set	Standard	5
29	8 Port Switch	Standard	2
30	Safety Shoes	Standard	5
31	Safety Helmet	Standard	5
32	Safety Gloves	Standard	5

Marks Distribution

Outcome	Outcome code	Total Th marks	Total Pr marks
Explain importance of Security surveillance system along with different types and nodes of it.	ELE/1020/OC1	20	50
Demonstrate different types of CCTV camera, their functions, special application of Pan-Tilt-Zoom camera, pixel requirement	ELE/1020/OC2	20	50
Use different types of lenses and sensors in a CCTV camera and their functions	ELE/1020/OC3	20	50
Demonstrate function, features and use of various types of DVR in CCTV surveillance system	ELE/1020/OC4	20	50
Explain networking, OSI architecture and IP addressing, the process of remote access to a DVR	ELE/1020/OC5	20	50
Demonstrate the use of various types of cables used in CCTV surveillance system, connectors of Co-axial, Twisted pair(UTP & STP) and Siamese cable	ELE/1020/OC6	10	50
Demonstrate site survey and installation process, post installation checking, maintenance and servicing methodology	ELE/1020/OC7	10	70
Demonstrate the process of setting up a DVR, setting up the angle of camera, setting up of alarm, motion detection, recordings and backup	ELE/1020/OC8	20	70
Work effectively at workplace following safe and ethical working practices and good customer relationship.	ELE/1020/OC9	10	60
Work in real job situation with special emphasis on basic safety and hazards in this domain (OJT).	ELE/1020/OC10	0	300
Employability Skill-60 Hrs	DGT/VSQ/N0102	50	0