



معاونت پژوهش، برنامهریزی و سنجش مهارت دفتر پژوهش، طرح و برنامهریزی درسی

استاندارد آموزش شایستگی

MikroTik Certified Wireless Engineer (MTCWE)

گروه شغلی

فناوري اطلاعات

کد ملی آموزش شایستگی

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Deputy of training Plan and curriculums office

Competency Training standard

Title

MikroTik Certified Wireless Engineer (MTCWE)

Iran Technical and Vocational

T Occupational group

Information Technology(IT)

International code

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Date of standard compilation: 2015/10/13

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- Scientific content Child Chi
- Equipment Training Organization
- Tools

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Iran Technical and Vocational Training Organization

Definitions:

Job standard:

The characteristics 'required competencies and abilities for Efficient Performance in work environment is called "the Job standard", and sometimes "The Occupational standard"

Training standard:

The Training Map for achieving the Job's subset Competencies.

Job title:

Is a set of Tasks and Abilities which is expected from an employed person in the defined level

Job description:

A statement covering the most important elements of a job, namely the position or title of the job, the duties, job's relation with other jobs in a occupational field, the responsibilities, workplace conditions and required performance standards.

Course duration:

The minimum of time which is required to achieve the training objects.

Admission requirements:

The minimum of competencies and abilities which are obligatory for a potential admission.

Evaluation:

The process of collecting evidence and judgment about wetter a competency is achieved or not. Include: written examination, practical examination

Required Qualifications for Trainers:

The minimum of Trainer's technical and vocational abilities which the trainer is required to have.

Competency:

The ability of efficient performing a duty in a variety of workplaces conditions

Knowledge:

The minimum set of facts and mental capacities which is necessary for achieving a competency. This can include science, (Mathematics, physics, chemistry or biology), technology or technical.

Skill:

The minimum coordination between mind and body for achieving an ability or competency. It normally applied to practical skills.

Attitude:

A set of emotional behaviors required for achieving a competency and can have non-technical skills and occupational ethics.

Safety:

The cases which doing or not doing something can cause harm or accident

Environmental Consideration:

A set of consideration about the act which should be done to minimize the environmental damage or pollution.

competency title:

MikroTik Certified Wireless Engineer(MTCWE)

competency description:

MTCWE is one of the engineering course of MikroTik. This course is about wireless network and special feature offer by RouterOS

The holder of MTCWE Certification knows wireless networks concepts and protocols, wireless standard, MikroTik wireless tools, MikroTik special Wireless standard, wireless security and wireless troubleshooting.

The holder of MTCRE certification have following proficiency:

- Will have the ability to understand wireless standards
- Will have the proficient knowledge about different parf of a wireless system include wireless card, wireless antenna, and RouterBoard's wireless features
- Will have the ability to understand and use wireless tools
- Will have the ability to understand and implement wireless advance setting on RouterOS
- Will have the ability to understand and implement wireless connection on Layer2 and Layer3
- Will have the ability to understand and implement wireless security
- Will have the ability to understand and implement WDS and mesh protocol
- Will have the ability to understand and implement Nstreme and Nv2 Protocol
- Will have the ability to understand and implement wireless routble shooting

admission requirements:

minimum degree of education: Post first year of high school

minimum physical and mental ability:-

prerequisite skills: CompTIA Network+ certification – MTCNA Certification

Course duration:

Course duration: 64 hours

Course Evaluation :(%)

| Number of questions | 25 |
|--------------------------|------------|
| Passing score | 60% |
| Conditional | 50-59% |
| Fail | 0-49% |
| Duration | 60 Minutes |
| Available Language | English |
| Associated Certification | MTCWE |



Technical and Locational

IRANTVTO Evaluation :(%)

Written Examination:25% Practical Examination:65%

Ethics:10%

- MTCWE degree holders with 2 years experience
- Computer related Bachelor with 2 years experience

competency training standard

tasks

| Row | Title |
|-----|----------------------------|
| 1 | Wireless Installations |
| 2 | Wireless Standard |
| 3 | Wireless Tools |
| 4 | Wireless Troubleshooting |
| 5 | Wireless Advanced Settings |
| 6 | 802.11n |
| 7 | Wireless Security |
| 8 | WDS and MESH |
| 9 | Wireless Bridging |
| 10 | Nstreme Protocol |
| 11 | Nv2 Protocol |

Iran Technical and Vocational Training Organization

| | | time | | | |
|------------------------------------------------|-----------------|--------------------------|------------------------|-----|-----------------------------|
| Title: | theoretical | practical | total | | |
| Wireless Installations | Determined | by the inst | ructor | | |
| Knowledge ,skill ,attitude ,safety, Environmen | ntal Consid | eration | | | ments ,tools, als ,books |
| Knowledge and Skill: | Determ | nined by t | he | - | Internet |
| - Wireless routers | ins | structor | | | connection |
| o RouterBoard Hardware | | | | _ | MikroTik |
| - Wireless cards | | | | | Wiki |
| - Antenna types | | | \setminus | ١. | Computer |
| | $\rightarrow 1$ | $\rightarrow \leftarrow$ | \vdash | | with at least |
| Auto 1 | | | $\bot \downarrow \bot$ | | |
| Attitude: | | | | | 2Gbiga byte |
| Speed and accuracy in doing the right thing | | | | | Of RAM |
| | | | | | and any |
| | 4/_ | | | | version of |
| Health & Safety: | | | | | windows 7 |
| Compliance with safety protection in the w | orkplace | | | - | One |
| Environmental Consideration: | Lan | dI | 0 | cat | RouterBoad which have |
| Compliance with environmental protection | Orgo | ani: | za | tio | at least one wireless card |
| | | | | | for every |
| | | | | | two person |

| | time | | | | |
|-----------------------------------------------------------------|--------------|----------------|---------|-----|-----------------------------|
| Title: Wireless Standard | theoretical | practical | total | | |
| Wheless Standard | Determine | d by the instr | ructor | | |
| Knowledge ,skill ,attitude ,safety, Environmental Consideration | | | | | ments ,tools, als ,books |
| Knowledge and Skill: | Determined | l by the ins | tructor | - | Internet |
| - 802.11 a/b/g/n | | | | | connection |
| - Bands and channel width | | | | _ | MikroTik |
| - Frequencies | | | | | Wiki |
| | | | | _ | Computer |
| | | | | | with at least |
| Attitude: | | | | | 2Gbiga byte |
| Speed and accuracy in doing the right | tthing | | | | Of RAM |
| | 2 | | | | and any |
| Health & Safety: | ¥ P | | | | version of |
| Compliance with safety protection in | the workplac | e | | 7 | windows 7 |
| | | | | - | One |
| | | | | | RouterBoad |
| Environmental Consideration: | | | | | which have |
| Compliance with environmental prote | | | | | at least one wireless card |
| Training | z Org | gani | iza | tio | for every two person |

| Contents analysis form | time | | | | |
|-------------------------------------------------------|---------------|----------------|---------|-----|----------------------------|
| Title: Wireless Tools | theoretical | practical | total | | |
| Wireless Tools | Determine | d by the instr | uctor | | |
| Knowledge ,skill ,attitude ,safety, Env | vironmental (| Considerati | on | | ments ,tools, als ,books |
| Knowledge and Skill: | Determined | d by the ins | tructor | - | Internet |
| - o Wireless Tools + LAB | | | | | connection |
| o Scan | | | | _ | MikroTik |
| o Frequency usage | | | | | Wiki |
| o Spectral Scan/History | | | | | |
| o Snooper | | | \\ | - | Computer |
| o Align | | | M | | with at least |
| o Sniffer | | | | | 2Gbiga byte |
| Attitude: | 2 | | | | Of RAM |
| Speed and accuracy in doing the right | thing | | | | and any |
| | -45 | | | | version of |
| W. M. O.G. C. | | | | | windows 7 |
| Health & Safety: Compliance with safety protection in | the workplac | 0 | | - | One |
| Compliance with safety protection in | me workprac | ·C | | | RouterBoad |
| Environmental Consideration: | al a | nd | Lo | cat | which have at least one |
| Compliance with environmental prote | ection | gani | iza | tio | wireless card for every |
| | | | | | two person |

| | time | | | | |
|------------------------------------------------------------------|---------------|----------------|---------|-----|-----------------------------|
| Title: | theoretical | practical | total | | |
| Wireless Troubleshooting | Determine | d by the instr | uctor | | |
| Knowledge ,skill ,attitude ,safety, Env | rironmental (| Considerati | on | | ments ,tools, als ,books |
| Knowledge and Skill: | Determined | d by the ins | tructor | - | Internet |
| - Troubleshooting wireless | | | | | connection |
| clients + LAB | | | | _ | MikroTik |
| o Registration table analysis | | | | | Wiki |
| o Ack-Timeout/Distance | | | | | , , |
| o CCQ | | | | - | Computer |
| o TX/RX Signal Strength | | | M | | with at least |
| o Frames and HW-frames | | | | | 2Gbiga byte |
| o Data-rates | 3 | | | | Of RAM |
| Attitude: | 2 5 | | | | and any |
| Speed and accuracy in doing the right | thing | | | | version of |
| | | | | | windows 7 |
| Health & Safety: | | | | _ | One |
| Compliance with safety protection in | the workplac | e | | | RouterBoad |
| Iran Technic | eal a | nd | 100 | cai | which have at least one |
| Environmental Consideration: Compliance with environmental prote | ction 7 | gani | iza | tio | wireless card for every |
| | | | | | two person |

| | time | | | | |
|-------------------------------------------|--------------|---------------|-------|-----|-----------------------------|
| Title: | theoretical | practical | total | | |
| Wireless Advanced Settings | Determined | by the instru | ıctor | | |
| Knowledge ,skill ,attitude ,safety, Envi | | | | | ments ,tools, als ,books |
| Knowledge and Skill: | | nined by th | e | - | Internet |
| - Advanced Wireless Tab | ins | structor | 1 | | connection |
| settings + LAB | | | | - | MikroTik |
| o HW-retries | | | | | Wiki |
| o HW-protection o Adaptive-noise-immunity | | | | | Computer |
| - WMM | | | | | with at least |
| - Country regulation settings | -271 | | M | | 2Gbiga byte |
| - TX-power + LAB | | | | | Of RAM |
| - Virtual-AP | | | | | |
| Attitude: | | | 7/ | | and any |
| Speed and accuracy in doing the right t | hing | | | | version of |
| | | | | | windows 7 |
| | | | | - | One |
| Health & Safety: | | | | | RouterBoad |
| Compliance with safety protection in the | ne workplace | nd I | 00 | cat | which have at least one |
| Environmental Consideration: | Org | ani. | za | tio | wireless card for every |
| Compliance with environmental protect | tion | | | | two person |

| | time | | | | |
|------------------------------------------|--------------|---------------|-------|-----|-----------------------------|
| Title: | theoretical | practical | total | | |
| 802.11n | Determined | by the instru | ıctor | | |
| Knowledge ,skill ,attitude ,safety, Envi | | | | | ments ,tools, als ,books |
| - 802.11n wireless protocol + | Determ | nined by th | e | - | Internet |
| LAB | ins | structor | | | connection |
| o Features | | | | _ | MikroTik |
| o Data Rates | | | | | Wiki |
| o Channel bonding | | | | | |
| o Frame Aggregation | | | | - | Computer |
| o TX-power for N cards | | | | | with at least |
| o Chain settings | | | M | | 2Gbiga byte |
| o Wireless link debugging | | | | | Of RAM |
| Attitude: | | | | | and any |
| Speed and accuracy in doing the right t | thing | | | | version of |
| | 786 | | | | |
| | | | | 7 | windows 7 |
| Health & Safety: | | | | - | One |
| Compliance with safety protection in the | ne workplace | | | | RouterBoad |
| | 1 | | | | which have |
| Environmental Consideration: | al ai | nd I | 0 | cat | at least one wireless card |
| Compliance with environmental protect | tion 178 | ani. | za | tio | for every two person |

| | time | | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------|---------------|---------|-----|-----------------------------------------------------------------------------------------------------|
| Title: | theoretical | practical | total | | |
| Wireless Security | Determined | by the instru | ictor | | |
| Knowledge .skill .attitude .safety. Environmental Consideration | | | | | ments ,tools, ials ,books Internet |
| - Wireless Security Measures + | ins | structor | | | connection |
| LAB o Access Management o Access-List/Connect-List o RADIUS o Authentication o Encryption o EAP o Management Frame protection Attitude: Speed and accuracy in doing the right t | hing | | | - | MikroTik Wiki Computer with at least 2Gbiga byte Of RAM and any version of windows 7 One RouterBoad |
| Health & Safety: Compliance with safety protection in the | ne workplace | nd I | , O(| cai | which have at least one wireless card |
| Environmental Consideration: Compliance with environmental protec | Org | ani. | za | tio | for every two person |

| | time | | | | |
|------------------------------------------|--------------|-----------------|-------|-----|------------------------------|
| Title: | theoretical | practical | total | | |
| WDS and MESH | Determined | by the instru | ictor | | |
| Knowledge ,skill ,attitude ,safety, Envi | | | | | ments ,tools, ials ,books |
| Knowledge and Skill: | Determ | nined by th | e | - | Internet |
| - Wireless WDS protocol + | ins | structor | | | connection |
| LAB | | | | - | MikroTik |
| o Dynamic/Static WDS | | | | | Wiki |
| o RSTP Bridge | | $\rightarrow -$ | | | |
| - Wireless MESH + LAB | | | // | _ | Computer |
| o HWMP+ Mesh | | | | | with at least |
| Attitude: | | | | | 2Gbiga byte |
| Speed and accuracy in doing the right t | hing | | | | Of RAM |
| | | | | | and any |
| | | | | | version of |
| Health & Safety: | | | | | windows 7 |
| Compliance with safety protection in the | ne workplace | | | - | One |
| Environmental Consideration: | al ai | nd I | 00 | cai | RouterBoad which have |
| Compliance with environmental protec | | ani. | za | tio | at least one wireless card |
| | | | | | for every |
| | | | | | two person |

| Contents analysis form | time | | | | |
|------------------------------------------------------------------------|------------------------------|--------------|----------|-----------------------------|----------------------------|
| Title: | theoretical | practical | total | | |
| Wireless Bridging | Determined by the instructor | | | | |
| Knowledge ,skill ,attitude ,safety, Environmental Consideration | | | • • | ments ,tools, als ,books | |
| Knowledge and Skill: | Determ | nined by the | e | - | Internet |
| - Wireless Transparent Bridge | instructor | | | | connection |
| + LAB | | | | - | MikroTik |
| o WDS bridging | | | | | Wiki |
| o AP/Station-WDS | | + | \vdash | | |
| o Pseudobridge | | | | - | Computer |
| o MPLS/VPLS tunnel | | | | | with at least |
| Attitude: | | | | | 2Gbiga byte |
| Speed and accuracy in doing the right thing | | | | Of RAM | |
| | | | | | and any |
| | | | | | version of |
| Health & Safety: | | | | | windows 7 |
| Compliance with safety protection in the workplace | | | | _ | One |
| | | | | | RouterBoad |
| Environmental Consideration: Compliance with environmental protection | | | cat | which have at least one | |
| Training | | ani. | za | tio | wireless card for every |
| | | | | | two person |

| | time | | | | | |
|-----------------------------------------------------------------|------------------------------|--------------|-------|------------|-------------------------------------|--|
| Title: Nstreme Protocol | theoretical | practical | total | | | |
| | Determined by the instructor | | | | | |
| Knowledge ,skill ,attitude ,safety, Environmental Consideration | | | | | Equipments ,tools, materials ,books | |
| Knowledge and Skill: | Detern | nined by the | e | - | Internet | |
| - MikroTik Wireless Nstreme | instructor | | | | connection | |
| Protocol + LAB | | | | - | MikroTik | |
| o Features | | | | | Wiki | |
| o Configuration options | | | | | , , ==== | |
| o Nstreme Dual | | | | - | Computer | |
| o Troubleshooting | | | | | with at least | |
| Attitude: | | | | | 2Gbiga byte | |
| Speed and accuracy in doing the right thing | | | | Of RAM | | |
| | | | | | and any | |
| | | | | | version of | |
| Health & Safety: | | | | windows 7 | | |
| Compliance with safety protection in the workplace | | | - | One | | |
| | | | | | RouterBoad | |
| Environmental Consideration: | | | | which have | | |
| Compliance with environmental protection | | | | | at least one wireless card | |
| Training | Org | ani. | za | tio | for every two person | |

Contents analysis form

| | time | | | | |
|------------------------------------------------------------------------|------------------------------|---------------|---------------|-----------------------------|----------------------------|
| Title: | theoretical | practical | total | | |
| Nv2 Protocol | Determined by the instructor | | | | |
| Knowledge ,skill ,attitude ,safety, Environmental Consideration | | | | ments ,tools, als ,books | |
| Knowledge and Skill: | Determ | ined by the | e | - | Internet |
| - MikroTik Wireless Nv2 | instructor | | | connection | |
| Protocol + LAB | | | | _ | MikroTik |
| o Features | | | | | Wiki |
| o Configuration options | | | \vdash | | Computer |
| o Troubleshooting | | \rightarrow | $\overline{}$ | _ | - |
| | | | | | with at least |
| Attitude: | | | N | | 2Gbiga byte |
| Speed and accuracy in doing the right thing | | | | Of RAM | |
| | | | | | and any |
| | | | | | version of |
| Health & Safety: | | | | | windows 7 |
| Compliance with safety protection in the workplace | | | | _ | One |
| | | | | | RouterBoad |
| Environmental Consideration: Compliance with environmental protection | | | cat | which have at least one | |
| Training | Org | ani. | za | tio | wireless card for every |
| | | | | | two person |

Equipment & Tools & Materials & Resources (books, site, software...) form mikrotik.com and wiki.mikrotik.com

^{*}Required quantity for each 15 Trainees

^{*} One 751 RouterBoared or similar model which support wireless for every two person