

# THE NARTE EMC ENGINEER CERTIFICATION PROCESS - A PERSONAL EXPERIENCE

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# NARTE

- **NARTE** is a worldwide, non-profit, professional telecommunications association which certifies qualified engineers and technicians in the fields of Telecommunications, Electromagnetic Compatibility/Interference (EMC/EMI), Product Safety (PS), Electrostatic Discharge Control (ESD) and Wireless Systems Installation.

# NARTE

- National Association of Radio and Telecommunication Engineers
  - Established 1982
  - EMC certification started in 1987
  - EMC Grandfathering ended in June 1990
- EMC certification initiated by NAVAIR to improve technical quality of support
- Purpose of EMC credential Certification Program is to foster technical "excellence"

# NARTE STATEMENT

- The program benefits the individual engineer, the technician, and the EMC community as a whole by establishing a standard of excellence in EMC engineering that will endure and extend across the boundaries of private and government agencies.

# NARTE CERTIFICATIONS

- EMC Engineer, EMC Technician
- ESD Engineer, ESD Technician
- EMC Accredited Test Laboratory personnel, Engineer and Technician
- Telecommunication Certifications, Wireless Engineer and Wireless Technician (Various classes)
- FCC Commercial Licenses
- Product Safety Engineer (New)

# NARTE Certification

- Telecommunications

Telecommunications certification is applicable to professionals practicing a wide range of telecommunications disciplines, to include RF, Non RF, wireless, photonic systems, PCS/PCN, cellular, satellite, LAN, WAN and many more.

# NARTE Certification

- Wireless Installation

Certified Wireless Systems Installers are professional engineers and technicians who design and install wireless systems which do not require a license from the FCC, such as Information Systems, Security Systems and Transportation Systems.

# NARTE Certification

- EMC Electromagnetic Compatibility

EMC certification is applicable to professional engineers and technicians practicing in EMC fields including bonding, shielding, grounding, EMI prediction, EMI analysis, conducted and radiated interference, and lightning protection.



# NARTE Certification

- EMC Accredited Test Lab Personnel

This endorsement distinguishes individuals with expertise and experience in Accredited EMC Test Labs and test governing directives, such as FCC CISPR, AS/NZS, MIL-STD, VCCI and others.

# NARTE Certification

- ESD Electrostatic Discharge Control

ESD certification is appropriate for engineers and technicians whose training and experience have primarily focused on problems, engineering design and corrective measures associated with minimizing or eliminating electrostatic discharge.

# NARTE EMC MEMBERSHIP

- NARTE has almost 3,000 EMC'ers certified worldwide
- NARTE has over 15,000 Engineers and Technicians certified worldwide
- International Presence in 26 Countries

# NARTE EMC CERTIFICATION

- 4 step process
  - Education- Education is evaluated by NARTE and applied to work experience requirement
  - Work Experience - 9 years or more of applicable engineering work
  - Peer endorsement- 1 Supervisory and 2 additional references
  - Examination – Compose 10 multiple choice questions and supporting references and pass the NARTE EMC engineer's examination

# NARTE CERTIFICATION PROCESS

- Complete EMC Application Form
  - \$65 application fee (includes \$30 testing fee)
  - Yearly dues \$65

# EMC EXAM

- Two 4 hour sessions
- Each session consists of 48 questions
- You are required to answer 40 of the 48 questions
- You can eliminate 8 questions in each session
- You must answer 56 of the 80 (70 %) questions correctly to pass the exam

# NARTE EMC ENGINEER EXAMINATION

- Open Book Test
- Complete list of reference material is at NARTE website
- Laptop and/or calculator can be used

# REFERENCES

- ***Study Guide and Question Preparation Guide for EMC Credentials Examination***, The National Association of Radio and Telecommunications Engineers, Inc. 1995
- ***Reference Data for Engineers: Radio, Electronics, Computer and Communications***, Howard W. Sams Co., Inc., Indianapolis/Kansas City/New York, Seventh Edition, 1988.
- ***ANSI/IEEE STD 100: IEEE Standard Dictionary of Electrical and Electronic Terms***, IEEE, 1984.
- Skolnik, Merrill L., ***Radar Handbook***, McGraw-Hill Book Company, New York, 1970.
- Paul, Clayton R., ***Introduction to Electromagnetic Compatibility***, New York, John Wiley & Sons, Inc., 1992 Bell Labs Loop Transmission Div
- Kraus, John D., ***Electromagnetics***, McGraw Hill, 1986



# EMC EXAM

- Engineering Pass rate is 75%
- Technician pass rate is 52%
- At 2003 IEEE Symposium (Boston), 11 out of 15 people passed EMC Engineering test

# CATEGORIES OF EMC EXAM QUESTIONS

- A Field Theory
- B Antennas
- C Coupling
- D Shielding
- E Transmission Lines
- F Electrical Networks
- G Filters
- H Amplifiers

# CATEGORIES OF EMC EXAM QUESTIONS (CONTINUED)

- I Mathematics
- J EMI Prediction & Analysis
- K Signals & Transforms
- L Spectrum Analysis
- M Test & Measurement/Test Facilities
- N EMC Design
- O Terminology
- P Special Devices, Materials & Components

# CATEGORIES OF EMC EXAM QUESTIONS (CONTINUED)

- Q EMP
- R ESD
- S Lightning
- T Specifications and Standards
- U Grounding & Bonding
- V Safety
- W EMC Management
- Z Military Specifications, Standards & Handbooks

# MILITARY STANDARD QUESTIONS

- NARTE developed with the US Military (NAVAIR). Today EMC discipline reaches into commercial applications worldwide.
- NARTE now limits the number of US Mil Std based questions to 8 in each section. Examinee can skip these questions entirely if they wish.

# TYPICAL QUESTION

- During a survey, a meter reading of 97 dB $\mu$ V/m is recorded. The cable loss is 2.5 dB, attenuation is 10 dB and the antenna gain is -20 dBi. What is the corrected value in V/m.
  - A) 0.07 V/m
  - B) 2.99 V/m
  - C) 29.9 V/m
  - D) 7.0 V/m

# ANSWER

- $E_{\text{actual}} = E_{\text{measured}} + \text{cable loss} + \text{Attenuation} - \text{Antenna Gain}$
- $E_{\text{actual}} = 97 \text{ dB}\mu\text{v/m} + 2.5 + 10 \text{ dB} - (-20 \text{ dBi}) = 129.5 \text{ dB}\mu\text{v/m}$
- $\text{dB} = 20 \text{ Log} (V1/ V2)$
- $E_{\text{actual}} = (\text{Log } 10^{-1} (129.5/20)) = 2.985 \times 10^6 \mu\text{v/m}$
- $E_{\text{actual}} = 2.985 \text{ V/m}$ , Answer is B

# NARTE STUDY GUIDES

- NARTE offers a study guide for sale
- It comes in hard copy and CD ROM copy
- CD ROM contains some military specifications



# THE TEST

- Questions are varied, some are hard some are simpler
- Time Management is very important
- Bring all the references you can carry
- Know the reference Sources that you are bringing

# Question Set

- NARTE has signed Memorandum of Agreement (MOA) with the IEEE EMC society whereby the IEEE EMC Society will take over the care of the NARTE EMC question set.

# NARTE TEST CENTERS

- On website many locations - proctored exam
- Given every year on Friday of IEEE EMC Symposium week
- Monday of IEEE EMC symposium week is a training class

# NARTE TEST RESULTS

- You are notified within a few weeks of test results
- Retests can be taken in 90 days
- Test can be taken multiple times

# CERTIFICATION'S VALUE

## To the Employer

- NARTE Certification assures the employer a measurable level of expertise and quality of work
- Certification levels provide incentive for achievement to employees
- Provides a demonstrable benchmark to which organizations can train and evaluate their technical staff
- Certification fosters industry growth by demanding standards of technical excellence
- Organizations fostering NARTE's reputable certification enjoy an enhanced public image.

# CERTIFICATION'S VALUE

## To the Certified Individual

- NARTE Certification represents career performance excellence
- Provides credentials in specific areas of expertise based on recognized standards
- NARTE Certification has been recognized as proof of professional competence in US courts
- The US Government and more than 500 US companies, including telephone companies, public utilities, railroads and state municipalities value NARTE certification to the extent of reimbursing certification fees

# CONTACT NARTE

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