

# ANZAN - Asian Epilepsy Academy (ASEPA)

## EEG Certification Examination



# EEG Certification Examination

- **Aims**

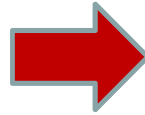
- **To stimulate self-learning in EEG**
- **To set and improve the standard of practice of EEG in the Asian-Oceanian region**

- **Role**

- **A part of ANZAN Level 2 EEG training requirements**

# EEG Certification Examination

**Part 1: Written**



**Part 2: Oral**

**HELD AT:**

**ANZAN Annual Scientific Meeting  
or at a separate date, in the main centres  
(Australia and New Zealand)**

**Epilepsy Society of Australia  
Annual Scientific Meeting**

# Before Applying For Part 1 Exam

- **Candidates are expected to have training that includes broad exposure to the scientific and technical aspects of EEG**
- **Candidates are expected to have extensive experience interpreting EEGs in various age groups and in a wide range of clinical disorders**
- **Candidates should have satisfactorily completed Level 2 EEG training, as per ANZAN guidelines, *or* are intending to complete this training within the next year**

**Please note, the EEG Examination  
Application Form requires**

**VERIFICATION OF EEG TRAINING**

***To be completed by EEG Supervisor/s***

**EXAMINATION FEE PAYMENT**

**Part 1 Examination Fee is \$AU225**

**Part 2 Examination Fee is \$AU300**

# Part 1 Examination

- **Written**
- **Answer 150 Multiple Choice Questions in 3 hours**
- **3 Sections (50 questions each)**
  1. **EEG recording techniques and instrumentation**
  2. **Normal EEGs**
  3. **Abnormal EEGs**
- **Each question will have 5 choices of which only one is correct**
- **No minus mark for wrong answer**

# Topics In Written Examination

- **Neuroanatomy and Neurophysiology**

- Anatomy of neural generation
- Mechanisms of EEG generation
- Pathophysiology of abnormal waveforms
- Basic mechanisms of epileptogenesis

- **EEG Recording Techniques**

- Head measurement and marking
- Electrode position nomenclature (International 10-20 & 10-10 System)
- Electrodes: properties and application techniques
- Impedance measurements
- Activation procedures such as hyperventilation, sleep deprivation, photic stimulation

- **Instrumentation, Polarity and Localization**

- Basic electricity and electronics
- Amplifiers and their characteristics
- Calibration
- Waveform measurements (voltage, frequency, and duration)
- Filters, sensitivity and frequency response curves
- Localization and polarity
- Electrical safety
- Principles of EEG digitalization including analog-to-digital conversion (vertical and horizontal resolution), sampling rate (aliasing and Nyquist frequency), screen or monitor display (sensitivity scale and pixel resolution), etc
- Recording reference (electrode site, average reference and Laplacian reference)
- Montages and reformatting

- **Artefacts**

- All physiological and non-physiological artefacts including artefacts caused by chewing, sweating, eye movements, ECG, pulse motion, movement of head/body, electrode pops or movements, electrical fields from electrical devices (TV, telephones), respirator-induced movements, intravenous drips/drip pumps, etc

# Topics In Written Examination

- **EEG Interpretation and Reporting**
  - Principles of interpretation
  - General classification of abnormal EEGs
  - Elements of EEG reports
  - How to make good reports
- **Normal EEG in Adult & Elderly**
  - Normal awake and normal sleep patterns including alpha, beta, theta, delta waves, mu, lambda waves, POSTs, Vertex sharp transients, spindles, K-complex
  - Normal responses to hyperventilation and photic stimulation
  - Changes in EEG in the elderly
- **Normal EEG in Infants and Children**
  - Normal patterns of various ages from neonates up to adolescents
- **Normal Variants & Uncommon Patterns of Doubtful Significance**
  - Small sharp spike / benign epileptiform transients of sleep
  - Wicket spikes
  - Psychomotor variants
  - 14&6 positive spike
  - Breech rhythm
  - Sub-clinical rhythmic EEG discharges in adults (SREDA)
  - Alpha variants,
  - Phantom spike-waves patterns



# Topics In Written Examination

- **Non-Epileptiform Patterns**

- Slow waves
- Triphasic waves
- Generalized periodic complexes/patterns
- Periodic lateralized epileptiform discharges (PLEDs/LPDs)
- Coma and stupor

- **Epileptiform Patterns**

- Definition of epileptiform patterns
- Types & recognition of various inter-ictal epileptiform patterns such as sharp waves, spikes, polyspikes, 3Hz spike & wave complexes, 4-6Hz spike & wave complexes, slow spike & wave complexes, photo-paroxysmal responses, hypsarrhythmia
- Ictal patterns
- How to differentiate interictal from ictal patterns
- EEG patterns in specific epilepsy syndrome such as focal (e.g. Benign Rolandic Epilepsy, Benign Epilepsy of Childhood with Occipital Paroxysms) and generalized (West Syndrome, Lennox-Gastaut Syndrome, Absence Epilepsy, Juvenile Myoclonic Epilepsy, etc) epilepsy syndromes
- EEG in status epilepticus

- **Long-term EEG Monitoring**

- Types of long-term EEG recording
- Indications and limitation of ambulatory and video-EEG monitoring
- Various semiology and their localizing & lateralizing values

- **Use of EEG in the Management of Seizure and Non-Seizure Disorders**

- Strength and limitations of EEG
- Indications for ordering EEG
- Yields of finding abnormality (e.g. epileptiform patterns) in patient with & without seizure disorders
- Use of long-term EEG monitoring in patients with refractory epilepsy
- Use of EEG in treatment & prognosis of epilepsy
- Use of EEG in non-seizure disorders (e.g. CVA; metabolic & toxic encephalopathies; dementia; brain tumors; head trauma; headaches, etc)

# Eligibility for Part 2

- **Must have passed Part 1 Written exam**

- Part 1 Pass requires  $\geq 50\%$  for at least 2 of the 3 sections

- Passing mark for each section is **50%**

- Overall average mark for 3 sections must be  $\geq 50\%$

# Part 2 Examination

## Oral examination

- 2 stations,  
30 minutes each
- 2 examiners at each  
station

## • Station 1

- Review 2 EEG recordings  
brought by each candidate

## • Station 2

- Report 20 EEG samples  
provided by the  
Examination Board

# Station 1

- Review and discuss 2 complete EEG records brought by each candidate from his/her routine EEG laboratory
- Both EEGs could be recorded by technologist under the candidate's direct supervision, and should be in the candidates opinion of good technical quality
- Recordings of normal EEGs, demonstrating electrocerebral silence and/or both EEGs showing the same abnormalities are not acceptable and will result in failure of this Station

# EEG Recordings

- **The 2 EEG recordings need to be recorded on digital media and to be reviewed on EEG software on the candidate's own laptop computer**
- **Candidates are required to demonstrate the ability to change sensitivity & filter settings as well as montages**
- **Candidates need to take responsibility should they not be able to open the EEG files during the examination**
- **Advisable for candidates to prepare hardcopy of the relevant EEG findings in case their laptop computer does not function normally during the examination**

# EEG Reports

- Each record should have a report dictated by the candidate and brought to the examination  
*(2 printed copies for each EEG, one for each examiner)*
- To prepare for a good EEG report, please refer to the "American Clinical Neurophysiology Society Guideline 7: Guidelines for EEG Reporting"

<https://www.acns.org/practice/guidelines>

[https://www.acns.org/UserFiles/file/Guideline7-GuidelinesforEEGReporting\\_v1.pdf](https://www.acns.org/UserFiles/file/Guideline7-GuidelinesforEEGReporting_v1.pdf)



## AMERICAN CLINICAL NEUROPHYSIOLOGY SOCIETY

### Practice

#### Guidelines and Consensus Statements

Introduction

Electroencephalography

Evoked Potentials

Neurophysiologic  
Intraoperative Monitoring

Long Term EEG Monitoring  
for Epilepsy

Long Term EEG Monitoring  
in Neonates

Continuous EEG  
Monitoring in Critical Care

Quantitative EEG

## Guidelines and Consensus Statements

### Guidelines

Title	Guideline	#	Date Revised
<b>Electroencephalography - <u>Introduction</u></b>			
	<a href="#">Minimum Technical Requirements for Performing Clinical EEG</a>	1	August 2016
	<a href="#">Guidelines for Standard Electrode Position Nomenclature</a>	2	August 2016
	<a href="#">Proposal for Standard Montages to be Used in Clinical EEG</a>	3	August 2016
	<a href="#">Guidelines for Recording Clinical EEG on Digital Media</a>	4	August 2016
	<a href="#">Minimum Technical Standards for Pediatric EEG</a>	5	August 2016
	<a href="#">Minimum Technical Standards for EEG Recording in Suspected Cerebral Death</a>	6	August 2016
	<a href="#">Guidelines for EEG Reporting</a>	7	August 2016



<https://www.acns.org/practice/guidelines>

# American Clinical Neurophysiology Society Guideline 7: Guidelines for EEG Reporting

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**Summary:** This EEG Guideline incorporates the practice of structuring a report of results obtained during routine adult electroencephalography. It is intended to reflect one of the current practices in reporting an EEG and serves as a revision of the previous guideline entitled "Writing an EEG Report." The goal of this guideline is not only to convey clinically relevant information, but also to improve interrater reliability for clinical and research use by standardizing the format of EEG reports. With this in mind, there is expanded documentation of the patient history to include more relevant clinical information that can affect the EEG recording and interpretation. Recommendations for the technical conditions of the recording are also enhanced to include post hoc review

parameters and type of EEG recording. Sleep feature documentation is also expanded upon. More descriptive terms are included for background features and interictal discharges that are concordant with efforts to standardize terminology. In the clinical correlation section, examples of common clinical scenarios are now provided that encourages uniformity in reporting. Including digital samples of abnormal waveforms is now readily available with current EEG recording systems and may be beneficial in augmenting reports when controversial waveforms or important features are encountered.

**Key Words:** EEG, Reporting, Routine, Adult, Pediatric, Guideline.

(J Clin Neurophysiol 2016;33: 328–332)

[https://www.acns.org/UserFiles/file/Guideline7-GuidelinesforEEGReporting\\_v1.pdf](https://www.acns.org/UserFiles/file/Guideline7-GuidelinesforEEGReporting_v1.pdf)



# Assessment at Station 1

- **Examiner 1**

- Review the EEG recording with candidate and:
  - » Assess the technical quality of EEG record
  - » Ask candidate to demonstrate EEG findings and main abnormality/ies
  - Assesses candidate's competency in EEG reading, including using sensitivity, filters, montages to localize / lateralize EEG abnormality/ies and other findings

- **Examiner 2**

- Marks the EEG report prepared by the candidate
  - » Assesses the quality of EEG reporting

- **Both Examiners**

- Check whether the reported EEG abnormalities correspond to the actual EEG findings

# **Station 2**

- Candidate will be given short segments (10 or more seconds) of 20 EEG samples supplied by the Board**
- Candidate is required to identify various patterns, their localization / polarity and clinical significance**

# Pattern Recognition

- **Normal EEG in Adult & Elderly**

- Normal awake and normal sleep patterns including alpha, beta, theta, delta waves, mu, lambda waves, POSTs, Vertex sharp transients, spindles, K complex

- Normal responses to hyperventilation and photic stimulation

- Changes in EEG in the elderly

- **Normal EEG in Infants and Children**

- Normal patterns of various ages from neonates up to adolescents

- **Normal Variants & Uncommon Patterns of Doubtful Significance**

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# Pattern Recognition

- **Epileptiform Patterns**
  - Types & recognition of various inter-ictal epileptiform patterns e.g. sharp waves, spikes, polyspikes, 3Hz spike & wave complexes, 4-6 Hz spike & wave complexes, slow spike & wave complexes, photo-paroxysmal responses, hypsarrhythmia, PLEDS
  - Ictal patterns
  - How to differentiate interictal from ictal patterns
  - EEG patterns in specific epilepsy syndrome such as focal (e.g. Benign Rolandic Epilepsy, Benign Epilepsy of Childhood with Occipital Paroxysms) and generalized (West Syndrome, Lennox Gastaut Syndrome, Absence Epilepsy, Juvenile Myoclonic Epilepsy, etc) epilepsy syndromes
  - EEG in status epilepticus
- **Non-Epileptiform and Periodic Patterns**
  - Slow waves
  - Triphasic waves
  - Generalized periodic complexes/patterns
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  - Coma and stupor
- **Artefacts**
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# Assessment at Station 2

- **Examiners**

- Examiner 1: lead the assessment for 10 EEGs

- Examiner 2: lead the assessment for 10 EEGs

- Both Examiners independently score all 20 EEGs

- **Scoring accounts for:**

- 1. Correct recognition of the pattern

- 2. Correct localization / lateralization and / or polarity

- 3. Ability to describe the clinical significance

# Passing Part 2

- Each candidate must pass **BOTH Stations 1 and 2**
  - Passing marks for each station: **≥60%**
- Combined Average mark of both stations must be: **≥ 65%**

**After passing, a Certificate will be issued**

# Direct any questions to

**John Dunne or Nicholas Lawn  
ANZAN EEG and Clinical Neurophysiology  
Committee**

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