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BINDT
 THE BRITISH INSTITUTE OF
 NON-DESTRUCTIVE TESTING



APPROVED TRAINING ORGANISATION

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NASA 213

Magnetic Particle Testing Curriculum

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Revision control sheet:

Rev No:	Date:	Compiled by:	Reviewed by:	Revision Description:
1	09-Jan-2018	Meyuri Moodley	Nishaan Kanhaye	Revised toward improvement. Name change. Aligned to BINDT approved course notes.
2	02-Apr-2025	Acacia Sureschandra	Nishaan Kanhaye	The document format was updated.

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1.0 Course Duration:

1.1 Level 1 and 2 Combined:

- a) The minimum training hours administered in Level 1 shall be 16.
- b) The minimum training hours administered in Level 2 shall be 24.
- c) For Level 1 and 2 combined courses the total training hours shall be a minimum of 40.

1.2 In all cases, level 1, level 2 or combined level 1 and 2, NASA shall administer the full theory content of Level 1 and 2.

2.0 Course Content:

2.1 Theory: The table below shows theory aspects covered:

Chapter Reference:	Level 1 and 2 combined:
Chapter 1: Qualification, Certification and Authorisation	SNT-TC-1A and ISO 9712 Levels of Qualification

Chapter 2: Basic Principles	Introduction Basic Principles History Test Procedures Test Objective Advantages Disadvantages
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Chapter 3: Magnetic Properties	Theory of Magnetisation Lines of Force Vector Field Material Properties Permeability Reluctance Retentivity Residual Magnetism Coercive Force Magnetic Flux and Magnetic Flux Density Flux Leakage Electromagnetism
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Chapter 4: Current Types	Direct Current Alternating Current Rectified Alternating Current Half Wave Rectified Alternating Current (HWAC) Full Wave Rectified Alternating Current (FWAC) Three Phase Full Wave Rectified Alternating Current Root Mean Square (RMS) Alternating Current (AC) Values
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<p>Chapter 5: Magnetizing Methods</p>	<p>Continuous Method Residual Magnetisation Method Longitudinal Magnetisation Permanent Magnets Advantages Of Permanent Magnets Disadvantages of permanent magnets Electromagnetic Yokes Advantages of Electromagnetic Yokes Disadvantages Of Electromagnetic Yokes Coil Technique Advantages of using a Coil Disadvantages of using a coil Circular Magnetisation Prod Technique Advantages of the Prod Technique Disadvantages of the Prod Technique Direct Magnetisation – Head Shots (Current Flow Technique) Advantages of the Head Shot Technique Disadvantages of the Head Shot Technique Central Conductor Technique (Induction Method) Advantages of the Central Conductor Technique Disadvantages of the Central Conductor Technique Multidirectional Technique Types of Power Supplies</p>
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<p>Chapter 6: Demagnetisation</p>	<p>Reversing the Magnetic Field Reducing the Magnetic Field</p>
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<p>Chapter 7: Detection Medium</p>	<p>Dry Magnetic Particles Wet Magnetic Particles Magnetic Rubber Health and Safety Considerations</p>
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<p>Chapter 8: Viewing Conditions</p>	<p>Electromagnetic Spectrum Visible Method Fluorescent Method Light Measurement Safety</p>
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<p>Chapter 9: Magnetic Field Indicators</p>	<p>Field Direction Field Strength Portable Magnetic Field Strength Meters Shim Type / Foil Strips The ASME Field Indicator The Berthold Penetrator (Berthold Spoon) Hall Effect Meters</p>
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<p>Chapter 10: Performance Checks</p>	<p>Calibration of Electrical Systems Calibration of Light Meters and Thermometers Current Flow Performance Check Magnetic Flow Performance Check Alternative Test Blocks Yoke Lift Test Settling Test UV-Light Calibration Test</p>
<p>Chapter 11: Classification of Discontinuities</p>	<p>Interpretation False Indications Non-Relevant Indications Relevant Indications Evaluation Discontinuity Categories Inherent Discontinuities Processing Discontinuities Service Discontinuities Crack Indications Solidification Cracks Processing Cracks Service Cracks Porosity Indications Forgings and Castings Plate Welds Extrusions Grinding Cracks Heat Treatment Cracks Fatigue Cracks</p>

2.2 Practical: The table below shows practical aspects covered:

<p>Level 1 and Level 2 Combined:</p> <p>Pre-test checks Visible techniques using electromagnetic yokes Visible light intensity measurement and verification at test area Pre-cleaning of test specimens Application of technique Viewing and interpretation of detected indications Recording and reporting according to written instructions Post cleaning Fluorescent techniques using electromagnetic yokes Ultraviolet light intensity measurement and verification at test area Selection of testing techniques Evaluation of indications according to codes, specifications or procedures</p>

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3.0 Learning outcomes:

3.1 Upon completion of training, students should be able to carry out and understand the following regarding visual testing:

Level 1 and Level 2 Combined: Basic principles General advantages and limitations Discontinuity categories Carry out pre-test checks, set up equipment, carry out tests and report results according to written instructions Basic principles General advantages and limitations Selection of electric currents used Discontinuity associated with manufacturing processes, categories and types Differences between visible and fluorescent methods Select test technique to be used based on specimen type, material, surface finish, etc. Interpret codes, specifications and procedures. Compile instructions according to specifications, codes or procedures Carry out pre-test checks, set up equipment, perform tests and report results

4.0 Course Outcome:

4.1 Successful Completion of Training:

Upon successful completion of the course, a successful completion of training certificate at the level attempted will be issued which meets eligibility to undertake the external PCN examination.

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