American Welding Society-Certified Welding Engineer

AMERICAN WELDING SOCIETY

CERTIFIED WELDING ENGINEER

SEMINAR AND EXAMINATION

SCHEDULE FOR THE YEAR – 2014 , INDIA

International Agency:

BETZ ENGINEERING & TECHNOLOGY ZONE

(Educational Division)

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About Us

BETZ Engineering & Technology Zone is an accredited International Agency for American Welding society, Florida, USA, to conduct seminars and certification programs for AWS in India and worldwide. BETZ is an ISO 9001:2008 company, also BETZ is the Only "ATF –Accredited Test Facility" by AWS to evaluate and certify welders in India.

The AWS-CWEng certification is one of the most reputed stamps of approval for any engineering industries. Industry professional who qualify for AWS-CWEng. are highly regarded and recognized throughout the welding and QA/QC segment, because this certification adheres to highly documented level of april and capability.

AWS-Certified Welding Engineer, Calendar for the year-2014						
S.No	Month	Seminar Dates	Seminar City	Study Holiday	Exam Date	City
1	July	25-29	Chennai	30	31	Chennai
2	August	25-29	Chennai	30	31	Chennai
3	October	25-29	Chennai	30	31	Chennai
4	November	24-28	Chennai	29	30	Chennai
5	December	22-26	Chennai	27	28	Coimbatore

As the slot are limited to five candidates per Seminar the allocation would be on "FIRST COME - FIRST SERVED" basis

You are invited to make use of this opportunity and we look forward to interact with you during this technical Qualification program.

Best Regards

RG.Ganesan
Head-Inspection Services.

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AWS-CW Eng.

A person with the demonstrated education, experience and knowledge as defined by this information and who successfully passes the required examinations is considered qualified an AWS Certified Welding Engineer (CW Eng.)

The CWEng is capable of directing those operations associated with weldments and other types of joints that are completed in accordance with the appropriate contract documents, codes, and other standards to produce a satisfactory product. The welding engineer¹s activities begins before production or construction welding and continues through the production process then ending when the production process is complete. Each employer is responsible for defining the scope of work of the Certified Welding Engineer.

Eligibility

In order to qualify as a certified welding engineer candidate you must be an

- Individual with Bachelor of Engineering (B.E) and a minimum of one (1) year relevant experience.
- Individual with Bachelor of Technology (B.Tech.) and a minimum of two (2) years relevant experience.
- Individual with other related Bachelor of Science (B.S.c.) degrees and a minimum of five (5) years of relevant experience.
- Individual with an Associate in Applied Science (A.A.S.) degree and a minimum of ten (10) years of relevant experience.
- Individual who have successfully completed high school or an equivalent program and a minimum of fifteen (15) years relevant

Exam pattern

The AWS Certified Welding Engineer (CW Eng.) examination consists of four parts. Parts 1 and 2 must be successfully completed in order to take Parts 3 and 4. The first two parts (1 and 2) of the exam are closed book and covers basic science fundamentals and applied science fundamentals. Exam will be of two hours for each part with written type multiple-choice questions (total time of four hours). Part 1 is a 35 questions multiple choice exam and Part 2 is a 25 questions multiple choice exam. They are given together and must be passed together. If the candidate fails one part, only that part must be repeated.

Exam for Parts 3 and 4 are open book examinations on welding related disciplines and practical welding and related applications. Each exam is three hours in length(Duration). Part 3 is a 45 questions essay exam. Part 4 is a 39 questions multiple choice exam. Candidates that successfully pass Parts 1 and 2 will be invited to sit for these exams and a separate application must be submitted to AWS.

Candidates must pass each of the four examinations with an individual score no less than 60% and attain a minimum weighted percentage of 70% for all 4 parts

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Seminar Pattern – Parts # 1&2

This Five days course focuses on the knowledge in Basic Science fundamentals(Part # 1) of Mathematics, Physics, Chemistry and applied science fundamentals of strength(Part # 2) of Materials, Heat Transfer & Fluid Mechanics and Electricity.

- 2 days seminar will be used to cover the basic science fundamentals of part-1 examination that covers all the facets of AWS B5.16, knowledge of mathematics, physics and chemistry.
- 2 days seminar will be used to cover the Applied science fundamentals of part-2 examination that covers the area of strength of materials, heat transfer, fluid mechanics and electricity.
- 1 day will be totally dedicated to discussion & review of parts-1&2.

Part #1 – Basic Science Fundamentals

Mathematics:

- Simple Calculations (multiple choices)
- Special Functions (exp, log)
- Trigonometric Functions (sin, cos, tan, cot, sec, csc, degrees, radians)
- Algebraic Equations (linear, quadratic, polynomial)
- Graphs And Equations (slope, intercept, roots, derivatives, minimum, maximum, interpolation and extrapolation)
- Geometry (common geometric shapes)
- Hyperbola, Parabola
- Complex Numbers
- Calculus (fundamentals of differential equations)
- Statistics (population and samples: normal distribution, mean, standard deviation and variance
- Simple correlation: linear regression via least squares method, r2 correlation)

Physics:

- Unit Conversion (dimension, mass, temperature, time, energy, power)
- Mass, Weight, Volume, Density
- Force, Energy, Work Done, Power
- Stress, Strain, Hooke's Law (elasticity)
- Moment And Momentum
- Temperature, Heat, Temperature Measurement, Thermocouples, Pyrometers
- Thermal Properties of Materials (Thermal Conductivity, Thermal Expansion, Thermal stress and strain)

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Chemistry:

- Symbols (elements and inorganic compounds—gases, fluxes, etc.)
- Molecular Weight and Stoichiometry
- Acids and Bases
- Balance Chemical Equations
- Gas Combustion Reactions (chemical heat generation) and oxidation-reduction reactions
- Ideal Gas Law (pressure, volume, temperature)
- Mass Balance (as in E7018 coating decomposition to gas, slag and metal)
- Bulk and Chemical Analysis Methodologies
- Reactivity, Toxicity, Environmental Effect, Disposal.

Part #2 – Applied Science Fundamentals

Strength of Materials:

- Load, Deformation (elastic and plastic, buckling), Stress- Strain, Young's Modulus, Shear Modulus, Stress- Strain Curve (yield stress, ultimate tensile stress, elongation) and tensile stress
- Shear stress computation
- Welded member cross-section effect
- Mechanical testing (tensile, bend, fracture toughness, hardness, creep, and fatigue) and data interpretation
- Law of Conservation of Energy/Momentum
- Stress analysis
- Typical engineering material properties

Heat Transfer and Fluid Mechanics:

- Heat Conduction, Convection and Radiation, Thermal Conductivity and Diffusivity, Heat Transfer Coefficients of Engineering Materials and Fourier's Law
- Heating Rate and Cooling Rate
- Industrial Heating Methods, Power Consumption and Gas Flow Rates
- Laminar and Turbulent Flow (reynold's number), Dew Point and Relative Humidity, Pressure and Regulators
- Venturi Effect and Gas Velocity Calculation

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- Atmospheric Pressure and Hyperbaric Conditions
- Vacuum Equipment and Measurements

Electricity:

- Current, Voltage, Resistance, Impedance and Circuits
- Ohm's Law
- Kirchhoff's Law
- Resistance Loss and Current Rectification
- Power Generation
- AC/DC, polarity
- Power Factor
- Electromagnetic Properties
- Right-Hand Rule
- Current and Voltage Measurements (devices and principles)

Registration process

All the registrations are to be completed preferably 4 weeks prior to the commencement of seminar with full payment to avoid disappointment. For more information call us on 9840175179 / 9551665681. E-mail: registration@welding-certification.com / betzzone@vsnl.net.Upon completion of registration process, candidates can collect their copy of study materials and AWS QC1:2007 certification handbook. This will help candidates to start there preparations immediately.

Mode of payment:

The seminar fees for parts-1&2 as mentioned below can be Drawn as D.D in favour of "BETZ ENGINEERING & TECHNOLOGY ZONE" payable at Chennai, India.

The examination fee in US$ in form of D.D in favour of "American welding society" payable at Florida, USA.

Fees Detail for Parts- 1 &2	
Seminar	Rs.30,000/-*
Examination	US$750
A/C.Accommodation Charges	Rs.5000/-
• **Service Tax: Rs.3708/-**	

Training Venue

All seminars will be conducted in our own state of the art training & research division situated in 12000 Sq.ft. premises near Tambaram, Chennai.

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Seminar Pattern – Parts # 3&4

These six days course focuses on the knowledge in welding related disciplines and practical welding related applications.

- 5 days of the seminar will be used to cover the NDE / weld discontinuities, welding heat sources, arc physics, welding processes and controls, welding and joining metallurgy, weld design, weld design safety, quality assurance and quality control in accordance with codes, specifications, other standards and / or drawings.
- 1 day will be totally dedicated to discussion & review of parts-3&4.

Part #3 – Welding Related Disciplines (Essay Exam)

NDE/Weld Discontinuities:

- NDE processes (radiographic, ultrasonic, magnetic particle, liquid penetrant, Eddy Current, etc.—characteristics, advantages and limitations)
- NDE symbols

Welding Heat Sources and Arc Physics:

- Power Source Static and Dynamic Characteristics (open circuit voltage and short circuiting current, slope)
- Differences Between CC And CV Designs (principle of self- adjusting)
- Welding Arc Characteristics (current and voltage relationship, arc length effect)
- Electron Emission (ionization potential, work function, electrode material, shielding gas and arc stability)
- Arc Temperature and Degree of Ionization (shielding gas influence)
- Magnetic Arc Blow (work lead location and condition)
- Lorentz Force (effect on droplet detachment and on adjacent power cables)
- Shielding Gas Drag Force (effect on droplet detachment and metal transfer mode) weld penetration and width for different shielding gases

Welding Processes and Controls:

- Arc Welding Processes (SMAW, GMAW, FCAW, GTAW, SAW, PAW)
- Resistance Welding Processes (RW, high frequency RW), high energy density welding processes (LBW, EBW)
- Cutting Processes (OFC, CAC, and PAC)
- Surfacing Processing (SW, THSP)
- Solid-State Welding Processes (FRW, FW)

Welding and Joining Metallurgy:

- Crystal Structure of Metals (FCC, BCC, HCP, unit cells, lattice parameter, c/a ratio, atom positions, interstitial positions)

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- Melting and Solidification, Phase Transformations and Phase Diagrams (eutectic, eutectoid, peritectic and monotectic, lever rule calculation) metallurgy and weldability of typical engineering materials (low carbon structural steels, cast irons, stainless steels, nickel alloys, aluminum alloys, titanium alloys, etc.) microstructure (e.g., ferrous alloys—grain boundary ferrite, acicular ferrite, bainite, martensite, austenite, delta ferrite, etc.) and mechanical properties
- Carbon Equivalent (CEIIW, Pcm, expressions, alloying content and carbon content effect)
- Hydrogen Assisted Cracking (heat-affected zone cracking, cold cracking) base metal matching (e.g., electrodes with high strength steels)
- Solidification cracking (segregation of impurity atoms, shrinkage cracking, lamellar tearing)
- Delta Ferrite in Stainless Consumables, Specifications for Consumables (categories; all position, rutile, basic)
- Flux metal Reactions (oxygen and sulfur control in weld pool)
- Typical Temperature Range of a Heat Source
- Temperature Distribution in a Weldment
- HAZ Formation
- Multi pass Thermal Experience, Reheated Weld Metal Properties
- Weld Macro and Micro-Graph Interpretation
- Solidification Profile and Preferred Grain Orientation (epitaxial growth)
- Origin of Weld Ripples
- Special Attributes of Base Metal (as-cast structure, deformation texture and oxide on flame cut surfaces
- Thermal Treatments (preheat, post heat, inter pass influence on weld cooling rate and residual stress distribution)
- Solid-State Transformations in Welds (different forms of ferrite, bainite, and martensite, sigma phase in stainless steels, Guinier-Preston type precipitates zones and ageing in aluminum alloys)
- Corrosion (sensitization in stainless steel welds and stress corrosion cracking in welds)

Weld Design:

- Structural fabrication requirements, sectional properties and stress gradient
- Stress triaxiality, weld symbols, hardness and microhardness (e.g., across a weld cross section)
- Tensile properties, ductility, toughness, fillet break test (influence of second phase and porosity), ductile fracture, brittle fracture, fatigue (initiation, propagation, failure, high-cycle, low-cycle), temperature and strain rate effect.

Brazing and Soldering:

- Characteristics of Brazing and Soldering
- Fluxes and Substrates
- Capillary Action
- Wetting and Spreading
- Contact Angle

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- Joint Clearance
- Viscosity
- Liquidus and Solidus
- Flow of Molten Filler in Horizontal and Vertical Joints (Maximum Penetration and Rate)
- Filler Metal Systems (Sn-Pb solders, Ni and Cu based alloys, Ag-Cu based brazing alloys)
- Intermetallic Compound Formation

Safety:

- Recognize health hazards relating to welding (fumes, toxic gases, noise and radiation)
- Recognize safety hazards (electric shock, compressed gases, fire, welding in a confined space, welding on Containers, piping and moving equipment)
- Recognize precautions to avoid injury
- Possess a working knowledge of safety and fire codes

Part #4 – Practical Welding and Related Applications

Exam using references on the application of welding engineering concepts in the areas of:

Welding safety, Weldment design, Welding Metallurgy, Materials, Welding Process Selection, NDE including Visual Weld Inspection, Quality Assurance, Quality Control in Accordance With Codes, Specifications, other Standards, and /or Drawings.

Mode of payment:

The seminar fees for parts-1&2 as mentioned below can be Drawn as D.D in favour of "BETZ ENGINEERING & TECHNOLOGY ZONE" payable at Chennai, India.

The examination fee in US$ in form of D.D in favour of "American welding society" payable at Florida, USA

Fees Detail for Parts- 3&4	
Seminar	Rs.40,000/-*
Examination	US$750
A/C.Accommodation Charges	Rs.5000/-
• **Service Tax: Rs.4944/-**	

Training Venue

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