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**QUESTION PAPER FOR WRITTEN EXAMINATION FOR POST OF
SENIOR INSTRUCTOR (MECHANICAL) [EX.CADRE]
[GRADE PAY (GP) Rs.4600/- (VI PC) / Level 7 (VII PC)] FOR
ADVANCED WELDING TRAINING INSTITUTE (AWTI), ICF**

Date of Examination: 02/06/17

**Duration: 3 Hours
Maximum Marks: 100**

Instructions to Candidate:

1. The Question Paper consists of Section 'A' and Section 'B'
2. Section 'A' consists of 25 Objective Type Questions which are compulsory. Each Objective Type Question carries 2 Marks. There is no Negative Mark for Wrong Answer to Objective Type Question. The Objective Type Questions have to be answered in Answer Sheet.
3. Section 'B' contains Descriptive Type Questions. Each Question in Section 'B' carries 10 Marks. Any 5 Questions have to be attempted from Section 'B'. The Marks are indicated against each Question.
4. The Candidate is instructed not to leave any identification Mark/Sign in the Answer Booklet which may reveal his/her identity. Any distinguishing Mark(s) made by the Candidate on the Answer Booklet will render the Answer Booklet invalid for evaluation.

Section 'A'

(25 x 2 Marks = 50 Marks)

1. Welding Process in which two pieces to be joined are overlapped and placed between two Electrodes is known as:
 - (a) Percussion Welding
 - (b) Projection Welding
 - (c) Seam Welding
 - (d) Spot Welding
 - (e) Butt Welding
2. Oxygen to Acetylene ratio in case of 'Carburizing Flame' is
 - (a) 0.5:1
 - (b) 0.9:1
 - (c) 1:1
 - (d) 1:1.2
 - (e) 2:1
3. Which of the following is preferred for Welding of Non-ferrous Metals by Arc Welding?
 - (a) AC Low Frequency
 - (b) AC High Frequency
 - (c) DC

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- (d) All of the above
 - (e) None of the above
4. The maximum Flame Temperature occurs at
- (a) The Tip of Flame
 - (b) The Inner core
 - (c) Next to the Inner core
 - (d) At the Outer core
 - (e) None of the above
5. Chromium, when added to Steel as an 'alloying element', has the effect of making the alloy more
- (a) Ductile
 - (b) Plastic
 - (c) Hardenable
 - (d) Malleable
6. The 'Weld Dimension' used to indicate minimum strength of a Fillet Weld is:
- (a) Leg Length
 - (b) Throat Thickness
 - (c) Width of Bead
 - (d) Length of Weld Element
7. 'Hot Shortness' is a term used to indicate:
- (a) Lamellar Tearing
 - (b) Solidification Cracking
 - (c) Hydrogen Cracking
 - (d) None of the above
8. The size of a 'Spot Weld' is determined by its:
- (a) Depth of Fusion
 - (b) Diameter of Weld at point of contact
 - (c) Depth of Penetration
 - (d) Thickness
 - (e) None of the above
9. As per ISO 4063:2009, Manual Metal Arc Welding (Metal Arc Welding with covered Electrode) is defined by following 'Process Index Number':
- (a) 131
 - (b) 212
 - (c) 141
 - (d) 111
 - (e) 121

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10. Expressing dimension as $18.3^{+0.00}_{-0.02}$ is the case of
- (a) Unilateral Tolerance
 - (b) Bilateral Tolerance
 - (c) Limiting Dimensions
 - (d) All of the above
 - (e) None of the above
11. IS: 919 on 'Limits and Fits' specifies following numbers of Grades of Fundamental Tolerances and Fundamental Deviations respectively:
- (a) 25, 18
 - (b) 25, 16
 - (c) 18, 22
 - (d) 18, 25
 - (e) 18, 20
12. Which Electrode deposits Weld Metal with the greatest Ductility and Resistance to Cracking:
- (a) Rutile
 - (b) Cellulosic
 - (c) Basic
 - (d) Oxidising
13. The highest requirement of 'Quality Level on the Finished Weld as per BS EN ISO 5817:2014 Standard is as under:
- (a) A
 - (b) D
 - (c) B
 - (d) C
 - (e) F
14. If the Diameter of a Conductor is doubled, then its Resistance will be reduced to:
- (a) Half
 - (b) One-Fourth
 - (c) One-Eighth
 - (d) One-Sixteenth
 - (e) $\frac{1}{\sqrt{2}}$ Times
15. The Least Count of a Metric Vernier Calliper having 25 Divisions on Vernier Scale, matching with 24 Divisions on Main Scale [1 Main Scale Division = 0.5 mm], is
- (a) 0.05 mm
 - (b) 0.01 mm
 - (c) 0.02 mm
 - (d) 0.001 mm
 - (e) 0.005 mm

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16. The commonly used 'Flux' for Brazing is

- (a) Resin
- (b) NH_4Cl
- (c) Borax
- (d) Soft Iron
- (e) Soft Silver

17. Capacitance acts to store Electrical Energy as

- (a) Current
- (b) Voltage
- (c) Magnetic Field
- (d) Electric Field

18. Steels are primarily designated according to:

- (a) Iron content
- (b) Carbon content
- (c) Alloying Elements
- (d) Hardness
- (e) Tensile Strength

19. 'Pre-heating' is essential in Welding

- (a) High Speed Steel
- (b) Stainless Steel
- (c) Cast Iron
- (d) German Silver
- (e) Aluminium

20. For a parallel load on a Fillet Weld of equal Legs, the Plane of maximum Shear occurs at

- (a) 22.5°
- (b) 30°
- (c) 45°
- (d) 60°

21. 'Carbon Equivalent' Values are useful to determine

- (a) Weldability aspects
- (b) Crack Sensitivity aspects
- (c) Typical Mechanical Properties
- (d) All the above

22. When Steel is heated to above its 'Upper Critical Temperature', the structure produced is

- (a) Martensite
- (b) Austenite
- (c) Pearlite
- (d) Sorbite

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23. What Destructive Test would be required to ascertain the likelihood of cracking in the 'Heat Affected Zone (HAZ)' of a Weld:
- (a) Nick Break
 - (b) Side Bend Test
 - (c) Charpy Impact Test
 - (d) Macro Test
24. The Welding of Stainless Steel is generally difficult because of the following reason:
- (a) Rust formation takes place
 - (b) High Melting Temperature of Stainless Steel
 - (c) Formation of Oxide Film
 - (d) Formation of Chromium Carbide
 - (e) Fear of development of Cracks
25. Weld Symbols placed on a dotted line in accordance with ISO requirement means:
- (a) Weld on 'arrow' side
 - (b) Weld on 'other' side
 - (c) Weld on Site
 - (d) Full penetration required

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Section 'B'

1. (a) What are the advantages and limitations of Submerged Arc Welding (SAW) Process? (5 Marks)
(b) Draw comparison between Gas Metal Arc Welding (GMAW or MIG) and Gas Tungsten Arc Welding (GTAW or TIG). (5 Marks)

2. (a) Describe the various Welding Process followed in LHB Shop of ICF for manufacture of 'FIAT Bogie'. (6 Marks)
(b) What are the advantages of 'Arc Welding'? Why is it difficult to start AC Arc? (4 Marks)

3. (a) What are various Welding Defects? Indicate their Causes and Precautions to be taken. (5 Marks)
(b) What are the qualities of Flame used for Welding? How can you distinguish between 3 types of Welding Flames and for what applications these are used? (5 Marks)

4. (a) How are Welding Electrodes classified? What are the advantages of classification of Welding Electrodes? (5 Marks)
(b) Describe various Fasteners used in Welding Components. (5 Marks)

5. (a) Describe the provisions in Official Languages Act, 1963. (5 Marks)
(b) What do you understand by Section 3(3) of Official Languages Act, 1963? (5 Marks)

6. Write Short Notes on the following: (10 Marks)
 - (a) Difference between Jigs and Fixtures
 - (b) Resistance Welding
 - (c) Laser Cutting
 - (d) Spot Welding
 - (e) Weldability of Metals