

# FACULTY OF ENGINEERING & TECHNOLOGY

## SYLLABUS

### FOR

### DIPLOMA COURSE IN WELDING

(SEMESTER – I & II)

SESSION: 2019–20



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## GURU NANAK DEV UNIVERSITY, AMRITSAR

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## Diploma Course in Welding (Semester System)

**Course structure:**

- (i) Basic Course: 6-Months**
- (ii) Diploma: 6-Months+6-Months= 1 Year**

The Diploma comprises Sl. No. (i) and (ii) as above.

The students of Diploma have to clear two examinations viz.

- i) after six months from the enrolment session and
- ii) after one year from the enrolment session

**Eligibility:** The admission shall be open to a candidate who has passed 10+2 examination with at least 50% marks in aggregate.

## Course Scheme

Subject Code	Skill Component / General Education	Subject Name	Hours per week			Credits	Total Marks	
							Theory	Practical
<b>Semester-I</b>			<b>(Total marks: 500)</b>			<b>L</b>	<b>T</b>	<b>P</b>
<b>Paper – 1</b>	General Education	<b>Communication Skills-I</b>	2	0	3	6	40	60
<b>Paper – 2</b>	General Education	<b>Computer Fundamentals-I</b>	2	0	3	6	40	60
<b>Paper – 3</b>	Skill Component	<b>Workshop Calculation and Science – I</b>	2	0	3	6	40	60
<b>Paper – 4</b>	Skill Component	<b>Engineering Drawing – I</b>	2	0	3	6	40	60
<b>Paper – 5</b>	Skill Component	<b>Professional Knowledge – I</b>	2	0	3	6	40	60
			<b>25</b>			<b>30</b>		

<b>Semester-II</b>			<b>(Total marks: 500)</b>					
<b>Paper – 6</b>	General Education	<b>Communication Skills-II</b>	2	0	3	6	40	60
<b>Paper – 7</b>	General Education	<b>Computer Fundamentals-II</b>	2	0	3	6	40	60
<b>Paper – 8</b>	Skill Component	<b>Workshop Calculation and Science – II</b>	2	0	3	6	40	60
<b>Paper – 9</b>	Skill Component	<b>Engineering Drawing – II</b>	2	0	3	6	40	60
<b>Paper – 10</b>	Skill Component	<b>Professional Knowledge – II</b>	2	0	3	6	40	60
			<b>25</b>			<b>30</b>		

**PAPER – 1: COMMUNICATION SKILLS-I  
(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 100  
Theory Marks: 40  
Practical Marks: 60**

**Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A**

**Writing Skills:**

Formatting personal and business letters:

1. Standard informal personal letters such as letters to parents, friends, social pillars.
2. Standard formal letters to Govt. Officers, superiors, utility purposes, News Paper Editors etc.
3. Standard Business Letters: Introducing and Promoting business activities, Placing an order, Cancelling an order, Reporting defects in receipt of ordered goods, Reporting delay in receipt of ordered goods, Responding to delay in supply of goods and services, Maintaining good customer relationships, Making customers give feedback to your services, Creating catalogue of your goods and services, Acknowledging services rendered by others,

**SECTION–B**

1. Resume Writing.
2. Writing of memos, notices and customer-friendly information.
3. Basic punctuation.
4. Blog writing

**SECTION–C**

**Speaking Skills:**

1. Using courtesy words and expressions
2. Storing standard day to day usages sentences, words and expressions in mind.
3. Creating similar new sentences
4. Using declarative, imperatives, interrogative and exclamatory sentences.

**SECTION–D**

1. Speaking catchy phrases , proverbs and expressions
2. Differentiating confusing words
3. Making PowerPoint presentation
4. Making short speech
5. Group Discussion/ Conversation

**Suggested Readings/ Books:**

1. KK Ramchandran, et al Business Communication, Macmillan, New Delhi
2. Swati Samantaray, Business Communication and Communicative English, Sultan Chand, New Delhi.
3. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)
4. Computer Mediated Communication 1st Edition by Crispin Thurlow Lara Martin Lengel , Alice Tomic.
5. Collins, Patrick. Speak with Power and Confidence. New York: Sterling, 2009.
6. Fitikides, T. J. Common Mistakes in English. London: Orient Longman.

**PAPER – 1: COMMUNICATION SKILLS-I  
(PRACTICAL)**

**Instructions** for Practical Exam: Entire syllabus will be covered for practical.

1. Speaking Skills
2. Using courtesy words and expressions
3. Storing standard day to day usages sentences, words and expressions in mind.
4. Speaking catchy phrases , proverbs and expressions
5. Making PowerPoint presentation
6. Making short speech
7. Group Discussion/ Conversation

**PAPER – 2: COMPUTER FUNDAMENTALS-I  
(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 100**

**Theory Marks: 40**

**Practical Marks: 60**

**Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A**

**Interacting with the computer:**

**Computer Components/ Input/ Output Devices:** Input devices; keyboard, mouse, scanner, output devices; VDU and printer (impact and non-impact printers), plotter etc. Primary and secondary storage (auxiliary storage), secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD memory).

**Computer Software concept:** System software, application software, operating systems, and advantages of software and application packages. Introduction to operating systems such as ms-dos and windows, difference between dos and windows

**Operating system-MS-Windows**

Operating system-Definition & functions, basics of Windows, Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders, Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance, Using windows accessories.

**SECTION–B**

**Word Processor using Microsoft Office**

Introduction to Word, Introduction to Parts of Word Window (Title Bar, Menu Bar, Tool Bar, The Ruler, Status Area), Page Setup, Creating New Documents, Saving Documents, Opening an Existing documents, insert a second document into an open document, Editing and formatting in document, Headers and Footers, Spell Checking, Printing document, Creating a Table Using the Table Menu and table formatting, Borders and Shading, Templates and Wizards, Mail Merge, importing, exporting and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering, Headings, styles, fonts and font size Editing, positioning and viewing texts, Finding and replacing text, inserting page breaks, page numbers , book marks, symbols and dates.

**SECTION–C**

**Presentation Software using Microsoft Office**

Introduction to MS Power point, Power point elements, Templates, Wizards, Views, Exploring Power Point Menu, Working with Dialog Boxes, Adding Text, Adding Title, Moving Text Area, Resizing Text Boxes, Adding Art, Starting a New Slide, Starting Slide Show, Saving presentation; Printing Slides, Views (View slide sorter view, notes view, outlines view) Formatting and enhancing text formatting, Creating Graphs (Displaying slide show and adding multi – media)

**SECTION–D****Spreadsheet using Microsoft Office:**

Elements of Electronics Spread Sheet and MS-Excel: Application/usage of Electronic Spread Sheet, Opening of Spread Sheet, and menu bar, Creation of cells and addressing of cells, Cell inputting.

Manipulation of cells: Enter texts numbers and dates, Creation of tables, Cell Height and Widths, Copying of cells.

Functions: Using functions: mathematical, statistical and financial function.

Spread sheets for Small accountings: Maintaining invoices/budgets, Totaling of various transactions, maintaining daily and monthly sales reports.

Charts: drawing different types of charts.

**Reference Books:**

1. Andrew S. Tanenbaum, David J. Wetherall Computer Networks (5th Edition), PHI.
2. P. K.Sinha, P. Sinha, Fundamentals of Computers, BPB Publishers.
3. A. Goel, Computer Fundamentals, Pearson Education.
4. Will Train, Gini Corter, Annette Marquis “Microsoft Office” BPB



**PAPER – 2: COMPUTER FUNDAMENTALS-I  
(PRACTICAL)**

**Instructions** for Practical Exam: Entire syllabus will be covered for practical.

**1. Operating system-MS-Windows:**

Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders, Control panel – display properties, adding and removing software and hardware, setting date and time, screensaver and appearance, Using windows accessories.

**2. Word Processor using Microsoft Office:**

Parts of Word Window (Title Bar, Menu Bar, Tool Bar, The Ruler, Status Area), Page Setup, Creating New Documents, Saving Documents, Opening an Existing documents, insert a second document into an open document, Editing and formatting in document, Headers and Footers, Spell Checking, Printing document, Creating a Table Using the Table Menu and table formatting, Borders and Shading, Templates and Wizards, Mail Merge, importing, exporting and inserting files, formatting pages, paragraphs and sections, indents and outdents, creating lists and numbering, Headings, styles, fonts and font size Editing, positioning and viewing texts, Finding and replacing text, inserting page breaks, page numbers , book marks, symbols and dates.

**3. Presentation Software using Microsoft Office:**

Power point elements, Templates, Wizards, Views, Exploring Power Point Menu, Working with Dialog Boxes, Adding Text, Adding Title, Moving Text Area, Resizing Text Boxes, Adding Art, Starting a New Slide, Starting Slide Show, Saving presentation; Printing Slides, Views (View slide sorter view, notes view, outlines view) Formatting and enhancing text formatting, Creating Graphs (Displaying slide show and adding multi – media)

**4. Spreadsheet using Microsoft Office:**

Elements of Electronics Spread Sheet and Ms-Excel: Opening of Spread Sheet, menu bar, Creation of cells and addressing of cells, Cell inputting.

Manipulation of cells: Enter texts numbers and dates, Creation of tables, Cell Height and Widths, Copying of cells.

Functions: Using functions: mathematical, statistical and financial function.

Spread sheets for Small accountings: Maintaining invoices/budgets, Totaling of various transactions, maintaining daily and monthly sales reports.

Charts: drawing different types of charts.

**PAPER 3: WORKSHOP CALCULATION AND SCIENCE – I****Time: 3 Hours****M. Marks: 100****Theory: 40****Practical: 60****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION-A**

**Unit:** Systems of unit-FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units.

**Fractions:** Fractions, Decimal fraction, L.C.M., H.C.F., Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems using Scientific Calculator.

**Ratio & Proportion:** Simple calculation on related problems.

**Percentage:** Introduction, Simple calculation. Changing percentage to fraction and decimal & vice-versa.

**SECTION-B**

**Material Science:** properties -Physical & Mechanical, Types–Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stain less steel, Non-Ferrous metals, Non-Ferrous Alloys.

**SECTION-C**

**Mass, Weight and Density:** Mass, Unit of Mass, Weight, difference between mass and weight. Density, unit of density. Relation between mass, weight & density. Simple problems related to mass, weight, and density.

**SECTION-D**

**Work, Power and Energy:** work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.

**PAPER 4: ENGINEERING DRAWING - I****Time: 3 Hours****M. Marks: 100****Theory: 40****Practical: 60****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A**

Engineering Drawing: Introduction and its importance

- Relationship to other technical drawing types
- Conventions
- Viewing of engineering drawing sheets.
- Method of Folding of printed Drawing Sheet as per BISSP:46-2003, Drawing Instruments : their Standard and uses
- Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor ,Drawing Instrument Box (Compass, Dividers, Scale ,Diagonal Scales etc.), Pencils of different Grades, Drawing pins /Clips.

Lines:

- Definition, types and applications in Drawing as per BISSP:46-2003
- Classification of lines (Hidden, centre, construction, Extension, Dimension, Section)
- Drawing lines of given length (Straight, curved)
- Drawing of parallel lines, perpendicular line
- Methods of Division of line segment

**SECTION–B**

Free hand drawing of

- Lines, polygons, ellipse, etc.
- geometrical figures and blocks with dimension

Transferring measurement from the given object to the free hand sketches.

### **SECTION–C**

Lettering and Numbering as per BISSP46-2003:-Single Stroke, Double Stroke, inclined, Upper case and Lowercase.

Drawing of Geometrical Figures: Definition, nomenclature and practice of:

- Angle: Measurement and its types, method of bisecting.
- Triangle –different types
- Rectangle,Square,Rhombus,Parallelogram.
- Circle and its elements.

Sizes and Layout of Drawing Sheets

- Basic principle of Sheet Size
- Designation of sizes
- Selection of sizes
- Title Block, its position and content
- Borders and Frames(Orientation marks and graduations)
- Grid Reference
- Item Reference on Drawing Sheet (ItemList)

### **SECTION–D**

Method of presentation of Engineering Drawing

- Pictorial View
- Orthographic View
- Isometric view

Symbolic Representation used in the related trade (as per BIS SP:46-2003) of:

- Fastener (Rivets, Bolts and Nuts)
- Bars and profile sections
- Weld, brazed and soldered joints.
- Electrical and electronics element
- Piping joints and fittings

**PAPER 5: PROFESSIONAL KNOWLEDGE - I****Time: 3 Hours****M. Marks: 100****Theory: 40****Practical: 60****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION-A**

- General discipline in the Institute
- Elementary First Aid.
- Importance of Welding in Industry
- Safety precautions in Shielded Metal Arc Welding, and Oxy- Acetylene Welding and Cutting.
- Introduction and definition of welding.
- Arc and Gas Welding Equipments, tools and accessories.
- Various Welding Processes and its applications.
- Arc and Gas Welding terms and definitions.
- Different process of metal joining methods: Bolting, riveting, soldering, brazing, seaming etc.
- Types of welding joints and its applications. Edge preparation and fit up for different thickness.
- Surface Cleaning
- Basic electricity applicable to arc welding and related electrical terms & definitions.
- Heat and temperature and its terms related to welding
- Principle of arc welding. And characteristics of arc.
- Common gases used for welding & cutting, flame temperatures and uses.
- Chemistry of oxy-acetylene flame.
- Types of oxy-acetylene flames and uses.
- Oxy-Acetylene Cutting Equipment principle, parameters and application.
- Arc welding powersources: Transformer, Motor Generator set, Rectifier and Inverter type welding machines and its care & maintenance.
- Advantages and disadvantages of A.C. and D.C. welding machines
- Welding positions as per EN&ASME: flat, horizontal, vertical and over head position.

**SECTION-B**

- Weld slope and rotation.
- Welding symbols as per BIS &AWS.
- Arc length – types – effects of arc length.
- Polarity: Types and applications.
- Calcium carbide properties and uses.
- Acetylene gas properties and generating methods.
- Acetylene gas Purifier, Hydraulic back pressure valve and Flash backarrestor
- Oxygen gas and its properties
- Production of oxygen by Air liquefaction.
- Charging process of oxygen and acetylene gases
- Oxygen and Dissolved Acetylene gas cylinders and Color coding for different gas cylinders.
- Gas regulators, types and uses.
- Oxy acetylene gas welding Systems (Low pressure and High pressure). Difference between gas welding blow pipe(LP & HP) and gas cutting blow pipe
- Gas welding techniques. Rightward and Leftward techniques.
- Arc blow – causes and methods of controlling.
- Distortion in arc & gas welding and methods employed to minimize distortion

**SECTION-C**

- Arc Welding defects, causes and Remedies.
- Specification of pipes, various types of pipe joints, pipe welding positions and procedure.
- Difference between pipe welding and plate welding.
- Pipe development for Elbow joint, “T” joint, Y joint and branch joint
- Manifold system
- Gas welding filler rods, specifications and sizes.
- Gas welding fluxes – types and functions.
- Gas Brazing & Soldering : Principles, types fluxes & uses
- Gas welding defects, causes and remedies.
- Electrode: types, functions of flux, coating factor, sizes of electrode, Coding of electrode as per BIS, AWS,
- Effects of moisture pick up.
- Storage and baking of electrodes.
- Special purpose electrodes and their applications.

**SECTION-D**

- Weldability of metals, importance of pre heating, post heating and maintenance of inter-pass temperature.
- Classification of steel.
- Welding of low, medium and high carbon steel and alloy steels.
- Effects of alloying elements on steel
- Stainless steel: types- weld decay and weldability.
- Brass – types – properties and welding methods.
- Copper – types – properties and welding methods.
- Aluminium and its alloys, properties and weldability, Welding methods
- Arc cutting & gouging,
- Cast iron and its properties types.
- Welding methods of cast iron.

**List of Practicals for Professional knowledge- I**

F-01 F-02	<ul style="list-style-type: none"> <li>- Induction training:</li> <li>- Familiarization with the Institute.</li> <li>- Importance of trade Training</li> <li>- Machinery used in the trade.</li> <li>- Introduction to safety equipment and their use etc.</li> <li>- Hack sawing, filing square to dimensions.</li> <li>- Marking out on MS plate and punching</li> </ul>
	<ul style="list-style-type: none"> <li>- Setting up of Arc welding machine &amp; accessories and Striking an arc</li> <li>- Setting of oxy-acetylene welding equipment, Lighting and setting of flame.</li> </ul>
OAW-01 OAW-02 OAGC-01	<ul style="list-style-type: none"> <li>- Fusion run without and with filler rod on M.S. sheet 2 mm thick in flat position.</li> <li>- Edge joint on MS sheet 2 mm thick in flat position without filler rod.</li> <li>- Marking and straight line cutting of MS plate. 10 mm thick by gas.</li> </ul>
SMAW-01 SMAW-02	<ul style="list-style-type: none"> <li>- Straight line beads on M.S. plate 10 mm thick in flat position.</li> <li>- Weaved bead on M.S. plate 10mm thick in flat position.</li> </ul>
OAW-03 SMAW-03	<ul style="list-style-type: none"> <li>- Square butt joint on M.S. sheet 2mm thick in flat Position.</li> <li>- Fillet “T” joint on M.S. Plate 10mm thick in flat position.</li> </ul>
OAGC-02 OAW-04 SMAW-04	<ul style="list-style-type: none"> <li>- Beveling of MS plates 10 mm thick. By gas cutting.</li> <li>- Open corner joint on MS sheet 2mm thick in flat Position</li> <li>- Fillet lap joint on M.S. plate 10 mm thick in flat position.</li> </ul>
OAGC-03 OAW-05 SMAW-05	<ul style="list-style-type: none"> <li>- Circular gas cutting on MS plate 10mm thick by profile cutting machine.</li> <li>- Fillet “T” joint on MS sheet 2 mm thick in flat position</li> <li>- Open Corner joint on MS plate 10mm thick in flat position.</li> </ul>

## Diploma Course in Welding (Semester – I)

OAW-06 SMAW-06	- Fillet Lap joint on MS sheet 2 mm thick in flat position. - Single “V” Butt joint on MS plate 12 mm thick in flat position (1G).
OAW-07 SMAW-07  SMAW-08	- Square Butt joint on M.S. sheet. 2mm thick in Horizontal position. - Straight line beads and multilayer practice on M.S. Plate 10 mm thick in Horizontal position. - Fillet “T” joint on M.S. plate 10 mm thick in Horizontal position.
OAW-08 SMAW-09	- Fillet Lap joint on M.S. sheet 2 mm thick in horizontal position. - Fillet Lap joint on M.S. plate 10mm thick in horizontal position.
OAW-09 OAW-10 SMAW-10	- Fusion run with filler rod in vertical position on 2mm thick M.S. sheet - Square Butt joint on M.S. sheet. 2mm thick in vertical position - Single Vee Butt joint on M.S. plate 12 mm thick in horizontal position (2G).
SMAW-11 OAW-11 SMAW-12	- Weaved bead on M.S Plate 10mm in vertical position. - Fillet “T” joint on M.S sheet 2 mm thick in vertical position. - Fillet “T” joint on M.S. plate 10mm thick in vertical position.
OAW-12 SMAW-13	- Structural pipe welding butt joint on MS pipe Ø 50 and 3mm WT in 1G position. - Fillet Lap joint on M.S. Plate 10 mm in vertical position.
SMAW-14 OAW-13	- Open Corner joint on MS plate 10mm thick in vertical position. - Pipe welding - Elbow joint on MS pipe Ø 50 and 3mm WT.
OAW-14 SMAW-15	- Pipe welding “T” joint on MS pipe Ø 50 and 3mm WT. - Single “V” Butt joint on MS plate 12mm thick in vertical position (3G).
OAW-15	- Pipe welding 45 ° angle joint on MS pipe Ø 50 and 3mm WT.
SMAW-16	- Straight line beads on M.S. plate 10 mm thick in overhead position.
SMAW-17	- Pipe Flange joint on M.S plate with MS pipe Ø 50 mm X 3mm WT - Fillet “T” joint on M.S. plate 10 mm thick in over head position.
SMAW-19 SMAW-20	- Pipe welding butt joint on MS pipe Ø 50 and 5 mm WT. in 1G position. - Fillet Lap joint on M.S. plate 10 mm thick in over head position.
SMAW-21 SMAW-22	- Single “V” Butt joint on MS plate 10 mm thick in overhead position (4G) - Pipe butt joint on M. S. pipe Ø 50mm WT 6mm (1G Rolled).
OAW-16 SMAW -23 OAW-17	- Square Butt joint on S.S. sheet. 2 mm thick in flat position. - Square Butt joint on S.S. Sheet 2 mm thick in flat position. - Square Butt joint on Brass sheet 2 mm thick in flat position.
OAW-18 SMAW-24 AG-01	- Square Butt & Lap joint on M.S. sheet 2 mm thick by brazing. - Single “V” butt joint C.I. plate 6mm thick in flat position. - Arc gouging on MS plate 10 mm thick.
OAW-19 OAW-20	- Square Butt joint on Aluminium sheet 3 mm thick in flat position. - Bronze welding of cast iron (Single “V” butt joint) 6mm thick plate



**Abbreviations:**

SMAW	-	Shielded Metal Arc Welding
OAW	-	Oxy-Acetylene gas Welding
OAGC	-	Oxy-Acetylene Gas Cutting
F	-	Fitting
WT	-	Wall Thickness.

**PAPER – 6: COMMUNICATION SKILLS-II  
(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 100  
Theory Marks: 40  
Practical Marks: 60**

**Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A**

**Reading Skills**

1. News paper reading skills
2. Content reading through internet sources
3. Comprehension Passages

**SECTION–B**

**Listening Skills**

1. Receiving voice calls
2. Attending active phone calls and responding
3. Daily news listening exercises (Audio and Video)
4. Note taking
5. Listening to native speakers conversations.

**SECTION–C**

**Common mistakes**

1. How to avoid common mistakes in: Nouns, Pronouns, Adjectives, Adverbs, Prepositions, word usage, helping verbs, verbs, phrases, clauses and sentences

**Foreign Words**

1. Frequently used foreign words.

**SECTION–D**

**Advertisement Writing**

Classified, Display, Boxed, Billboard, Online

**Suggested Readings/Books:**

1. KK Ramchandran, et al Business Communication, Macmillan, New Delhi
2. Swati Samantaray, Business Communication and Communicative English, Sultan Chand, New Delhi.
3. S.P. Dhanavel English and Communication Skills for Students of Science and Engineering (with audio CD)
4. Computer Mediated Communication 1st Edition by Crispin Thurlow (Lara Martin Lengel, Alice Tomic.
5. Collins, Patrick. Speak with Power and Confidence. New York: Sterling, 2009.
6. Fitikides, T. J. Common Mistakes in English. London: Orient Longman.

**PAPER – 6: COMMUNICATION SKILLS-II**

**(PRACTICAL)**

**Instructions** for Practical Exam: Entire syllabus will be covered for practical.

1. Receiving voice calls
2. Attending active phone calls and responding
3. Daily news listening exercises (Audio and Video)
4. Note taking
5. Listening to native speakers conversations.
6. Advertisements Writing
7. Frequently used foreign words.

**PAPER – 7: COMPUTER FUNDAMENTALS-II  
(THEORY)**

**Time: 3 Hrs.**

**Max. Marks: 100  
Theory Marks: 40  
Practical Marks: 60**

**Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A**

**Introduction to Networks:** Network Definition, Basic Components of a Network, Network types and topologies, Uses of Computer Networks, Network Architecture.

Transmission Media: Coaxial cable, twisted pair cable, fiber optics & satellites. OSI reference model, TCP/IP reference model, comparison of OSI and TCP reference model.

**Computer Communication**

**Basic of Computer Networks:** LAN, WAN, MAN.

Internet: Introduction to internet and its application/services.

Service on Internet: WWW and web-sites, Electronic mails, Communication on Internet.

**SECTION–B**

**Web Browsers:** Internet Explorer, Chrome and Firefox

Surfing the Internet: Giving the URL address, Search, Moving Around in a web-site, Printing or saving portion of web pages, down loading/uploading

Chatting on Internet

**Email:** Basic of electronic mail, Creating Email id, Mailbox: Inbox and outbox. Using Emails: Viewing an email, sending an Email, Saving mails, sending same mail to various users, Document handling: Sending soft copy as attachment, Enclosures to email, sending a Portion of document as email

**SECTION–C**

**Tally:**

**Introduction to Financial Accounting:** accounting concepts.

**Financial Accounting Basics:** company creation, accounts configuration, accounts classification, accounts master, creations of voucher, types and classes, accounts vouchers.

**Financial Accounting Advanced:** final accounts, bank reconciliation statement

**SECTION–D**

**Inventory:** introduction to inventory, stock groups, stock categories, stock item, reorder levels, locations / go downs, units of measure, price list, tariff classification, dealer excise, opening stock, pure inventory voucher, entry of pure inventory voucher, bill of material, purchase and sales order, foreign exchange transactions.

**Business Management:** New Year books, MIS reports, budget management, scenario management.

**Suggested Readings/ Books**

1. Tanenbaum A. S., “Computer Networks”, PHI.
2. TALLY ERP 9 TRAINING GUIDE - 4TH REVISED & UPDATED EDITION – 2018

**PAPER – 7: COMPUTER FUNDAMENTALS-II**  
**(PRACTICAL)**

**Instructions** for Practical Exam: Entire syllabus will be covered for practical.

1. Network types and topologies.
2. Electronic mails.
3. Communication on Internet.
4. Surfing the Internet: Giving the URL address, Search, Moving Around in a web-site, Printing or saving portion of web pages, down loading/uploading
5. Chatting on Internet
6. Introduction to financial accounting: accounting concepts.
7. Financial accounting basics: company creation, accounts configuration, accounts classification, accounts master, creations of voucher, types and classes, accounts vouchers.
8. Financial accounting advanced: final accounts, bank reconciliation statement
9. Inventory: introduction to inventory, stock groups, stock categories, stock item, reorder levels, locations / go downs, units of measure, price list, tariff classification, dealer excise, opening stock, pure inventory voucher, entry of pure inventory voucher, bill of material, purchase and sales order, foreign exchange transactions.
10. Business management: New Year books, MIS reports, budget management, scenario management.

**PAPER 8: WORKSHOP CALCULATION AND SCIENCE – II****Time: 3 Hours****M. Marks: 100****Theory: 40****Practical: 60****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A****Basic Algebra:**

Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).

**Mensuration:** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semicircle, Volume of solids–cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.

**SECTION–B**

**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables

**Elasticity:** Elastic & Plastic material. Stress & strain and their units. Young's modulus. Ultimate stress and breaking stress.

**SECTION–C****Heat & Temperature:**

Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, Scale of temperature, relation between different scales of temperature. Thermometer, pyrometer. Transmission of heat, conduction, convection, radiation.

**SECTION–D**

**Basic Electricity:** Introduction, use of electricity, how electricity is produced, Types of current- AC, DC, their comparison, voltage, resistance, their units. Conductor, insulator, Types of connections – series, parallel, electric power, Horse power, energy, unit of electrical energy. Electrical insulating materials. Basic concept of earthing. Area of irregular surfaces. Application related to shop problems. Material weight and cost problems related to trade. Temperature measuring instruments. Specific heats of solids & liquids. Thermal Conductivity, Heat loss and heat gain. Heat treatment and advantages.

**PAPER 9: ENGINEERING DRAWING - II****Time: 3 Hours****M. Marks: 100****Theory: 40****Practical: 60****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION–A****Dimensioning Practice:**

- Position of dimensioning (unidirectional, aligned, as per BISSP:46-2003)
- Types of arrow head
- Leader Line with text
- Symbols preceding the value of dimension and dimensional tolerance.

Drawing of Solid figures (Cube, Cuboids, Cone, Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.

**SECTION–B**

Free hand Drawing of Solid figures (Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.

Free Hand sketch of hand tools and measuring tools used in respective trades.

**Projections:**

- Concept of axes plane and quadrant.

**SECTION–C**

- Orthographic projections
- Method of first angle and third angle projections (definition and difference)
- Symbol of 1<sup>st</sup> angle and 3<sup>rd</sup> angle projection as per IS specification.

Drawing of Orthographic projection in 3<sup>rd</sup> angle.

**SECTION–D**

Free hand drawing of simple fastener (Rivet, Bolts, Nuts & Screw)

Free hand sketching of simple objects related to trade.

- Riveted joints-Butt & Lap (Drawing one for each type).
- Reading of drawing. Simple exercises related to missing lines, dimensions. How to make queries.
- Simple exercises relating missing symbols.
- Missing views
- Concept of preparation of assembly drawing and detailing. Preparation of simple assemblies & their details of trade related job/exercises with the dimensions from the given sample or models.
- Reading of fabricated engineering drawing

**PAPER 10: PROFESSIONAL KNOWLEDGE - II****Time: 3 Hours****M. Marks: 100****Theory: 40****Practical: 60****Instructions for the Paper Setters:-**

Eight questions of equal marks (Specified in the syllabus) are to be set, two in each of the four Sections (A-D). Questions may be subdivided into parts (not exceeding four). Candidates are required to attempt five questions, selecting at least one question from each Section. The fifth question may be attempted from any Section.

**SECTION-A**

- Safety precautions in Gas Metal Arc Welding, and Gas Tungsten Arc welding.
- Introduction to GMAW- equipment –accessories.
- Various other names of the process. (MIG/MAG/CO<sub>2</sub> welding.)
- Advantages of GMAW welding over SMAW , limitations and applications
- Process variables of GMAW.
- Modes of metal transfer – dipor short circuiting transfer, spray transfer (free flight transfer) and globular transfer (intermittent transfer) and Pulsed metal transfer.
- Wire feed system – types –care and maintenance.
- Welding wires used in GMAW, standard diameter and codification as per AWS.
- Types of shielding gases and gas mixtures used in GMAW and its applications.
- Flux cored arc welding– description, advantage, welding wires, coding as per AWS.
- Edge preparation of various thicknesses of metals for GMAW.
- GMAW defects, causes and remedies
- Heat input and techniques of controlling heat input during welding.
- Heat distribution and effect of faster cooling
- Pre heating & Post Weld Heat Treatment
- Use of temperature indicating crayons

**SECTION-B**

- Submerged arc welding process– principles, equipment, advantages and limitations
- Electro slag and Electro gas welding processes–principles, equipments, advantages and limitations
- Thermit welding process-types, principles, equipments, thermit mixture types and applications.
- Use of backing strips and backing bars
- GTAW process – brief description Difference between AC and DC welding, equipments, polarities and applications.
- Various other names of the process (TIG, Argonarc)
- Power sources for GTAW – AC& DC
- Tungsten electrodes –types & uses, sizes and preparation



**SECTION–C**

- GTAW Torches- types, parts and their functions
- GTAW filler rods and selection criteria
- Edge preparation and fit up.
- GTAW parameters for welding of different thickness of metals
- Pulsed TIG welding -brief description, pulse parameters slope up and slope down.
- Argon / Helium gas properties– uses.
- GTAW Defects, causes and remedy.
- Friction welding process- equipment and application
- Laser beam welding (LBW) and Electron beam welding (EBW)
- Plasma Arc Welding (PAW) and cutting (PAC) process– equipments and principles of operation.
- Types of Plasma arc, advantages and applications.

**SECTION–D**

- Resistance welding process-types, principles, power sources and welding parameters.
- Applications and limitations.
- Metalizing – types of metalizing principles, equipments, advantages and applications
- Manual Oxy – acetylene powder coating process- principles of operation and applications
- Welding codes and standards
- Reading of assembly drawing
- Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR)
- Hard facing/ surfacing necessity, surface preparation, various hard facing alloys and advantages of hard facing.
- Weld quality inspection, common welding mistakes and appearance of good and defective welds
- Weld gauges & itsuses
- Types of Inspection methods
- Classification of destructive and NDT methods
- Welding economics and Cost estimation.

**List of Practicals for Professional knowledge–II:**

GMAW-01	- Machinery used in the trade.
GMAW -02	- Introduction to safety equipment and their use etc. - Setting up of GMAW welding machine & accessories and Striking an arc - Depositing straight line beads on M.S Plate. - Fillet weld – “T” joint on M.S. plate 10 mm thick in flat position by Dip transfer.
GMAW-03	- Fillet weld – Lap joint on M.S.sheet 3mm thick in flat position by Dip transfer.
GMAW-04	- Fillet weld – “T” joint on M.S.sheet 3mm thick in flat position by Dip transfer.
GMAW-05	- Fillet weld – corner joint on M.S.sheet 3mm thick in flat position by Dip transfer.
GMAW-06	- Butt weld – Square butt joint on M.S sheet 3mm thick in flat position
GMAW-07	- Butt weld – Single “V” butt joint on M.S plate 10 mm thick by Dip transfer in flat position.
GMAW-08	- Fillet weld – “T” joint on M.S. plate 10mm thick in Horizontal position by Dip transfer.
GMAW-09	- Fillet weld – corner joint on M.Splate 10mm thick in Horizontal position by Dip transfer.
GMAW-10	- Fillet weld – “T” joint on M.S.sheet 3mm thick in Horizontal position by Dip transfer.
GMAW-11	- Fillet weld – corner joint on M.S.sheet 3mm thick in Horizontal position by Dip transfer.
GMAW-12	- Fillet weld – “T” joint on M.Splate 10mm thick in vertical position by Dip transfer.
GMAW-13	- Fillet weld – corner joint on M.Splate 10mm thick in vertical position by dip transfer.
GMAW-14	- Fillet weld – Lap joint on M.S.sheet 3mm thick in vertical position by Dip transfer.
GMAW-15	- Fillet weld – corner joint on M.S.sheet 3mm thick in vertical position by Dip transfer.
GMAW-16	- Fillet weld – Lap and “T” joint on M.S sheet 3mm thick in over head position by Dip transfer.
GMAW-17	- Tee Joints on MS Pipe Ø 60 mm OD x3 mm WT 1G position – Arcconstant (Rolling)

## Diploma Course in Welding (Semester – II)

GMAW-18	- Depositing bead on S.S sheet
GMAW-19	- Butt joint on Stainless steel 2 mm thick sheet in flat position by Dip transfer.
GTAW-01	- Depositing bead on Aluminium sheet 2 mm thick in flat position.
GTAW-02	- Square butt joint on Aluminium sheet 1.6mm thick in flat position.
GTAW-03	- Fillet weld – “T” joint on Aluminium sheet 1.6 mm thick in flat position.
GTAW-04	- Fillet weld – Outside corner joint on Aluminium sheet 2 mm thick in flat position.
GTAW-05	- Butt weld - Square butt joint on Stainless steel sheet 1.6 mm thick in flat position with purging gas
GTAW-06	- Fillet weld – “T” joint on Stainless steel sheet 1.6 mm thick in flat position.
GTAW-07	- Pipe butt joint on Aluminium pipe Ø 50 mm x 3 mm WT in Flat position.
GTAW-08	- “T” Joints on MS Pipe Ø 50 mm OD x3 mm WT, position –Flat
PAC-01	- Straight cutting on ferrous and non ferrous metals

## Diploma Course in Welding (Semester – II)

RW-01 RW-02	- Lap joint on Stainless steel sheet by Resistance Spot welding - MS sheets joining by Resistance Spot welding
OAW-01 OAW-02	- Square butt joint on Copper sheet 2mm thick in flat position. - “T” joint on Copper to MSsheet 2mm thick in flat position by Brazing
OAW-03 OAW-04	- Silver brazing on S.S Sheet with copper sheet “T” joint. - Silver brazing on copper tube to tube
SMAW-01 SMAW-02	- Repair welding of broken C.I machine parts. - Hard surfacing practice on M.S round rod Ø 25 mm by using Hard facing electrode.
I&T-01 I&T-02 I&T-03	- Testing of weld joints by visual inspection. - Inspection of welds by using weld gauges. - Dye penetrant test, - Magnetic particle test.
I&T-04 I&T-05 I&T-06	- Nick- break test. - Free bend test. - Fillet fracture test.

**Abbreviations:**

SMAW	- Shielded Metal Arc Welding
OAW	- Oxy-Acetylene Gas Welding
OAGC	- Oxy-Acetylene Gas Cutting
GMAW	- Gas Metal Arc Welding
GTAW	- Gas Tungsten Arc Welding
PAC	- Plasma Arc Cutting
RW	- Resistance Welding
I&T	- Inspection & Testing
WT	- Wall Thickness.