# GUJARAT TECHNOLOGICAL UNIVERSITY

**Program Name: Diploma Engineering**
**Level: Diploma**
**Branch: Mechanical Engineering**
**Subject Cod: DI04019041**
**Subject Name: Fabrication Technology**

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| **w.e.f. Academic Year:** | 2025-26 |
| **Semester:** | 4th |
| **Category of the Course:** | Professional Elective - II |

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| **Prerequisite:** | NIL |
| **Rationale:** | This course focuses on fabrication of different types process plant equipment used in various refineries, chemical, petro-chemical, solid-liquid-gas handling industries. This course would help students how to interpret design drawings, code & standards used in fabrication industry. Student also acquainted with use of code & standards for various preparing engineering documents. This course also provides opportunity for hands on practice for student to develop skill for process equipment fabrication with following necessary safety norms. |

**Course Outcome:**

After Completion of the Course, Student will able to:

| No | Course Outcomes |
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| 01 | Interpret term fabrication and weld ability. |
| 02 | Calculate the material requirements on basis of drawing interpretation. |
| 03 | Apply suitable fabrication procedures for equipment manufacturing. |
| 04 | Suggest testing & inspection procedures for pre-during-after fabrication work. |
| 05 | Select suitable surface finishing and coating method for fabricated equipment. |
| 06 | Plan process equipment erection & commissioning at site. |

**Teaching and Examination Scheme:**

| Teaching Scheme (in Hours) | | | Total Credits L+T+(PR/2) | Assessment Pattern and Marks | | | | Total Marks |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory | | Tutorial/ Practical | | |
| L | T | PR | C | ESE(E) | PA(M) | PA(I) | ESE(V) | |
| 3 | 0 | 2 | 4 | 70 | 30 | 20 | 30 | 150 |

**Course Content:**

| Unit No. | Content | No. of Hours | %of Weightage |
|---|---|---|---|
| **1. Introduction (CO-1)** | 1.1 Term fabrication<br>1.2 Need and scope of Fabrication technology<br>1.3 Weldability of materials<br>1.4 Term manufacturing and fabrication<br>1.5 List different code & standards (with full forms) used in fabrication & erection of equipment / piping.<br>1.6 Major national and international fabrication companies<br>1.7 Major national and international third party inspection agencies<br>1.8 General Designation used for various engineering items.<br>▪ Spiral wound gasket<br>▪ Vehicle Tyre<br>▪ Welding electrode and welding rods<br>▪ Piping<br>▪ Flanges<br>▪ Grinding wheels | **04** | **10% (7 marks)** |
| **2. Drawing Interpretation (CO-2)** | 2.1 Types of drawing<br>▪ Process Plant General Arrangement Drawing (GAD)<br>▪ Process plant process and instrumentation drawing (P&ID)<br>▪ Process Flow Diagram (PFD)<br>▪ Detail and Assembly Drawing (D&AD)<br>▪ Route sheet OR Operation sheet<br>▪ Structural Detail drawing<br>▪ Shop Lay out drawing<br>▪ Piping isometrics drawing<br>▪ Welding detail drawing<br>2.2 Fabrication documentation preparation from drawing<br>▪ Welding Procedure Specification & Procedure Qualification Record (WPS/PQR)<br>▪ Welder Performance Qualification & Welder Qualification Record (WPQ/WQR)<br>▪ Shop Weld Plan (SWP)<br>▪ Weld Test Plan (WTP)<br>2.3 Raw material requirement calculation from drawing (size, numbers, weight, process point of view)<br>▪ Plate calculation<br>▪ Piping , tube and fittings calculation<br>▪ Nozzle (flange and pipe/tube) calculation | **11** | **24% (17 marks)** |

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| | ▪ Dish end plate blank dia. calculation<br>▪ Weld consumable requirement calculation<br>▪ Structural items angle, I section, T section, C section, square solid/hollow bar, hexagonal solid/hollow bar, triangle solid/hollow bar calculation<br>▪ Piping erection calculation in inch-meter<br>▪ Piping welding calculation in inch-dia.<br>▪ Mechanical Structural works weld calculation.<br>2.4 Welding detailing preparation from drawing<br>▪ Weld Joint (WJ) nomenclature (Groove and Fillet weld) and WJ symbol<br>▪ Weld Edge preparation (WEP) nomenclatureWEP symbol<br>▪ Weld Location of Elements and its symbol<br>▪ Weld pass and Weld Layers<br>▪ Welding position (Groove & Fillet weld)<br>▪ Welding technique (forward and backward)<br>▪ Welding electrode designation (SMAW and GTAW electrode)<br>▪ Welding weaving patterns<br>2.5 Introduction to Code and standards used for fabrication<br>▪ ASME<br>▪ AWS<br>▪ ASTM<br>▪ TEMA<br>▪ EJMA<br>▪ D 1.1<br>▪ D 1.5 | | |
| **3. Fabrication Processes (CO-3)** | 3.1 Welding Process requirements<br>▪ Arc Welding parameters setting (Voltage, Current, welding speed, consumable feed and arc length)<br>▪ Gas welding parameters setting (gas pressure, gas flow, type of nozzle and optimized nozzle number)<br>▪ Preheating before starting welding<br>▪ Interpass during welding<br>▪ Post heating after welding<br>▪ Preheat, Interpass and post heat temperature measuring by thermal sticks<br>▪ PWHT for thermal stress relieving<br>3.2 Fabrication procedures | **11** | **23% (16 marks)** |

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| | ▪ Plate Edge bending for rolling<br>▪ Plate rolling<br>▪ Weld edge preparation<br>▪ Plate marking for shell, dish- end, tube sheet, RF pad etc.<br>▪ Plate cutting by gas cutting and plasma cutting<br>▪ Shell alignment by string and laser technology<br>▪ Nozzle Orientation marking on shell<br>▪ Reference line marking on shell by dumpy level<br>▪ Ovality measurement of shell and it's rectification by spiders.<br>▪ Profile checking by template (peak in / peak out)<br>▪ Circularity measurement by swing arm method.<br>▪ Offset rectification by wedge.<br>▪ Strip cladding and overlay<br>▪ Limpet coil marking on shell<br>▪ Shell to shell /dish end Long seam setup<br>▪ Shell to shell /dish end Circ. seam setup<br>▪ Method used to control thermal distortion<br>▪ Dish end manufacturing technique<br>3.3 Fabrication steps for with equipment function, name of parts,<br>▪ Pressure vessel / Storage vessel / Reaction vessel<br>▪ Shell and tube type heat exchanger<br>▪ Piping spools / multi-tier piping arrangement<br>▪ Industrial shed / electrical power transmission tower<br>3.4 Safety norms for,<br>▪ Work at heights<br>▪ before, during and after welding work<br>▪ PPEs for welding work<br>▪ work safety equipment | | |
| **4. Inspection and Testing (CO-4)** | 4.1 General terms regarding weld quality<br>▪ Weld quality<br>▪ Weld defects<br>▪ Stages of inspection<br>▪ Types of inspection<br>▪ Types of testing<br>▪ Difference between inspection and testing<br>4.2 Destructive Testing (procedure as per ASTM / ASME sec. v | **11** | **23% (16 marks)** |

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| | and Acceptance criteria as per ASME sec. viii div.1)<br>▪ Tensile testing<br>▪ Compressive testing<br>▪ Impact testing<br>▪ Hardness testing<br>▪ Weld bend testing<br>4.3 Non Destructive Testing (procedure as per ASTM / ASME sec. v and Acceptance criteria as per ASME sec. viii div.1)<br>▪ LPT<br>▪ MPT<br>▪ UT<br>▪ RT<br>▪ ECT<br>4.4 Special type of testing for equipment / piping operation<br>▪ Hydro test of pressure vessel / piping spools<br>▪ Pneumatic test of pressure vessel / piping spools<br>▪ Helium Leak test<br>4.5 Running inspection methods, visual inspection<br>▪ by eye contact (grinding spark)<br>▪ by smell<br>▪ by hand touch (surface finish)<br>▪ by earing<br>▪ by magnet (ferrous / nonferrous) | | |
| **5. Surface preparation, Finishing and Coating Methods (CO-5)** | 5.1 Surface preparation methods<br>▪ Sand blasting / ball blasting<br>▪ Surface grinding<br>5.2 surface finishing methods<br>▪ Manual and motorized Emery papering<br>▪ Manual and motorized wire brushing<br>▪ buffing wheel machining<br>▪ acetone / kerosene /petrol /diesel cleaning<br>5.3 surface color coating methods<br>▪ brush application<br>▪ roller application<br>▪ cotton application<br>▪ spray application<br>5.4 coating film thickness measurement techniques<br>▪ dry film thickness<br>▪ wet film thickness | **04** | **10% (7 marks)** |

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| **6. Installation, erection and commissioning of process equipment (CO-6)** | 6.1 Term installation, erection and commissioning<br>6.2 Difference between installation and erection<br>6.3 Type of static process plant equipment vessels, heat exchangers, distillation columns, piping & valves etc.<br>6.4 Type of rotary process plant equipment pump, fan, blowers, compressors, agitators, filters, turbines etc.<br>6.5 Installation of centrifugal pump at site<br>6.6Erection of vessel at site<br>6.7Erection and mechanical clearance of piping spools at site<br>6.8Commissioning of process plant | **04** | **10% (7 marks)** |
| | **Total** | **45** | **100 % (70 marks)** |

**SUGGESTED MST / ASSIGNMENT SYLLABUS**

| DESCRIPTION | LECTURE 1 | LECTURE 2 | LECTURE 3 |
|---|---|---|---|
| **MID SEM TEST (MST) SYLLABUS (30 MARKS)** | UNIT-1 (CO-1) & UNIT- 2.1, 2.2 (CO-2) | UNIT- 3.1, 3.2 (CO-3) | UNIT- 4.1, 4.2 (CO-4) |
| **END SEM ASSIGNMENT (ESA) SYLLABUS** | UNIT - 2.3, 2.4, 2.5 (CO-2) | UNIT-6 (CO-6) & UNIT- 3.3, 3.4 (CO-3) | UNIT-5 (CO-5) & UNIT-4.3, 4.4, 4.5 (CO-4) |

1. The MST exam can be conducted as descriptive paper, as MCQ paper with Physical OMR sheet, as MCQ quiz ONLINE google forms in any manner.
2. The ESA assignment should be given to student after Midsem exam and it should be cover balanced Cos, must be collected with practical term work file. (No marks, satisfactory level only)
3. The MST syllabus / ESA syllabus shown here is just as example, The institute is fully empowered to do changes, but the changes should be in term starting and the change instructions to be pass on students well in advance.

**Suggested Specification Table with Marks (Theory):**

| Distribution of Theory Marks | | | | | |
|---|---|---|---|---|---|
| **R Level** | **U Level** | **A Level** | **N Level** | **E Level** | **C Level** |
| 20 | 27 | 23 | 00 | 00 | 00 |

*WhereR:Remember;U:Understanding;A:Application,N:AnalyzeandE:EvaluateC:Create(asper Revised Bloom's Taxonomy)*

**References/Suggested Learning Resources:**

**(a) Books:**

| Sr. No. | Title of Book | Author | Publication |
|---|---|---|---|
| 1 | Welding technology | Khanna,O.P | DhanpatRai Publications, New Delhi |
| 2 | Welding engineering and technology | Parmar, R.S. | Khanna Publishers, New Delhi |
| 3 | Modern arc welding Technology | Nadkarni, S.V. | Advanioerlikon, Mumbai |
| 4 | Structural steel fabrication and erection | Saxena, S.K.; Asthana, R.B. | Somaiya Publishers, New Delhi |
| 5 | Metal cutting science and production technology | Jain, K.C.; Agrawal L.N. | Khanna Publishers, New Delhi |
| 6 | Manufacturing processes (Foundry, Forming and Welding) | Rao P.N. | Mc GRAW HILL |
| 7 | Metal Fabrication Technology | ShyamalMukharjee | PHI |
| 8 | Fabrication processes | Sudhir Gandhi | Nexus Stories publication, Surat |
| 9 | Fabrication Technology at a glance | Sudhir Gandhi | Nexus Stories publication, Surat |

**(b)Open source software and website:**

1. https://www.engineering.osu.edu
2. www.aws.org
3. www.careersinwelding.com
4. www.weldingalloys.com
5. www.adorweldingacademy.com
6. www.themanufacturinginstitute.org
7. www.asme.org

8. www.weldingdesign.com
9. www.engineeringtoolbox.com
10. www.asnt.org

**Suggested Course Practical List:**

| Sr. No. | Practical Outcomes (PrOs) | COs | Approx. Hrs. Required |
|---|---|---|---|
| 01 | **DESIGNATION OF PHYSICAL ENGINEERING ITEMS**<br>Find out the designation appeared on various items used in equipment fabrication from following list (any three).<br>a. Spiral wound gasket<br>b. Scooter tire and Car tire<br>c. Welding electrode and welding rods<br>d. Piping<br>e. Flanges<br>f. Grinding wheels<br>g. Gas bottles (acetylene, oxygen, LPG) | CO-1 | 02 |
| 02 | **STUDY OF GENERAL ENGINEERING DRAWINGS**<br>Study any two drawing from following list.<br>a. Process Plant General Arrangement Drawing (GAD)<br>b. Process plant process and instrumentation drawing (P&ID)<br>c. Process Flow Diagram (PFD)<br>d. Detail and Assembly Drawing (D&AD)<br>e. Route sheet OR Operation sheet<br>f. Structural Detail drawing<br>g. Shop Lay out drawing | CO-2 | 02 |
| 03 | **DRAWING STUDY : BILL OF MATERIAL**<br>Prepare bill of material from Pressure vessel equipment detail drawing.<br>**OR**<br>Prepare bill of material from Shell tube type heat exchanger equipment detail drawing. | CO-2 | 02 |
| 04 | **DRAWING STUDY : WELDING JOINT**<br>Draw actual welding joint from location of weld symbol shown in pressure vessel drawing.<br>**OR**<br>Draw actual welding joint from location of weld symbol shown in Heat Exchanger drawing. | CO-2 | 02 |
| 05 | **DRAWING STUDY : RAW MATERIAL REQUIREMENT CALULATION**<br>Find out required raw material requirement like shell plate blank, dished | CO-2 | 02 |

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| | end, end plate, skirt shell and related other parts, from pressure vessel drawing.<br>**OR**<br>Find out required raw material requirement like Tube sheet plate blank, end plate, HE main shell, HE channel shell, dish end supporting shell, baffles, tie rods, tubes from shell & tube type HE drawing. | | |
| 06 | **DRAWING STUDY : DISH END BLANK DIA CALCULATION**<br>Calculate dish end blank diameter for following type.<br>a. Torispherical type<br>b. Ellipsoidal type<br>c. Hemispherical type | CO-2 | 02 |
| 07 | **DRAWING STUDY : NOZZLE SCHEDULE**<br>Prepare Nozzle schedule with Location chart from pressure vessel drawing (different type of pipes / type of pipe size and type of flanges / flange size)<br>**OR**<br>Prepare Nozzle schedule with Location chart from HE drawing (different type of pipes / type of pipe size and type of flanges / flange size) | CO-2 | 02 |
| 08 | **DRAWING STUDY : PIPING ISOMETRICS**<br>Find out following points from piping isometrics drawing.<br>a. Find Start and End point co-ordinates from drawing.<br>b. Find different type of fittings used with size from drawing.<br>c. Calculate Different type of pipes and type of pipe size from drawing.<br>d. Calculate erection work in inch-meter<br>e. Calculate welding work in inch-dia from drawing. | CO-2 | 02 |
| 09 | **STUDY OF ENGINEERING DOCUMENTATION - I**<br>Prepare WPS and WPQ document for CS material pressure vessel **OR** shell & Tube type Heat Exchanger. (Take required data from ASME / AWS code) | CO-2 | 02 |
| 10 | **STUDY OF ENGINEERING DOCUMENTATION - II**<br>Prepare SWP and WTP document for typical pressure vessel **OR** shell & Tube type Heat Exchanger. | CO-2 | 02 |
| 11 | **PRACTICE OF FABRICATION PROCEDURES**<br>Practice (Whichever is possible in institute)<br>(minimum one demonstration per batch)<br>a. TWO shell making by rolling process and LONG SEAM tack welding<br>b. Measure ovality and rectify ovality by turn buckle type spiders.<br>c. Measure peak in- peak out and rectify by triangular wedges.<br>d. Two shell CIRC SEAM tack welding<br>e. Shell Alignment at 0-90-180-270 degree angles (By L shape and | CO-3 | 02 |

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| | string method).<br>f. Measure practically dia. and circ. Of vessel shell and compare with theoretical equation.<br>g. Reference line (vertical VRL by plumb and horizontal HRL by spirit level) marking on shell.<br>h. Calculate arc length from zero degree VRL and Calculate height from HRL for nozzle orientation marking on shell. | | |
| 12 | **NON DESTRUCTIVE TESTING OF SMALL WELD JOB**<br>Take one SMAW/GTAW welded job and Test the job by Liquid Penetrant Testing method and discuss the results. (minimum one LPT testing demonstration per batch) | CO-4 | 02 |
| 13 | **FINISHING & COATING OF SMALL WELD JOB**<br>Take one SMAW/GTAW welded job and Finish weld job by hand grinding process and apply color coating on job. (minimum one finishing & coating demonstration per batch) | CO-5 | 02 |
| 14 | **INSTALLATION OF CENTRIFUGAL PUMP**<br>Install& commission one centrifugal pump at site.<br>(minimum one demonstration per batch) | CO-6 | 02 |
| 15 | **MINI PROJECT (FABRICATED ITEM)**<br>Prepare any one fabricated item from following list.<br>(group of 5-6 students / minimum one item per batch).<br>Note: Corse teacher may select other than this list also, as per Institute convenience.<br>1. Podium<br>2. Shelf rake<br>3. Stool<br>4. Table with drawers<br>5. Bench-desk<br>6. Window greel<br>7. Door grill<br>8. Camera tripod<br>9. Mike stand<br>10. Display board stand<br>11. Shoes stand<br>12. Performance Stage<br>13. Banner stand<br>14. Tipoi<br>15. Long height table<br>16. Welding Work table<br>17. Chair<br>18. Fabricated Zulla<br>19. Cycle stand<br>20. cloth drying stand<br>21. car parking shade<br>22. Storage tank | CO-1 to CO-6 | 02 |
| **Total (Hours)** | | **ALL COs** | **30** |

**List of Laboratory/Learning Resources Required:**

| Sr. No. | Equipment Name | specification |
|---|---|---|
| 1. | Welding power source rectifier | ➢ AC input 220 volts, single phase, 50 Hz<br>➢ DC output 10-30 volt, 70-250Amp. |

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| | | ➢ Output wattage (1 to 5 kW). |
| 2. | Portable Plate rolling machine | ➢ Three high rolling machine with 0.5 meter length with max. Plate thickness capacity up to 10mm.<br>➢ 3-phase induction motor with 5kW capacity.<br>➢ Suitable reduction gear box. |
| 3. | Gas cutting set | ➢ Acetylene and oxygen gas cylinder.<br>➢ Pressure regulator and gas flow measuring device.<br>➢ Cutting torch with back fire arrester.<br>➢ Various nozzle tip set (2 to 6 mm). |
| 4. | Hand grinder | ➢ Disc Diameter 100 mm; 4 Inch<br>➢ machine with 670W brush motor<br>➢ Rated input power 660 W<br>➢ No-load speed 12,000 rpm<br>➢ dimensions (width) 77 mm<br>➢ Tool dimensions (length) 263 mm<br>➢ Tool dimensions (height) 95 mm<br>➢ Weight 1,5 kg |
| 5. | Power hacksaw machine | ➢ Cutting Blade Size 14 Inch<br>➢ Power Consumption HP<br>➢ Type Of Saw Hydraulic |

**Suggested Project List:**

1. **PPT PRESENTATION:** Prepare PPT on assigned topic by teacher AND Present on behalf of another Division/batch students/teachers.
2. **ANIMATION VIDEO OF PROCESS EQUIPMENT:** Prepare animation on assigned topic by teacher AND publish on department knowledge website / youtube channel.
3. **PREPARTION OF DEMONSTRATION CHARTS**: Prepare charts on assigned topic by teacher AND display in annual exhibition.
4. **SOLUTION OF INDUSTRY DEFINED PROBLEM:** Take any real industry problem related to fabrication and suggest probable solutions.

**Suggested Activities for Students: If any**

**ENGINEERING QUIZ (OFFLINE / ONLINE / BLANDED MODE)**

MCQ quiz from given fabrication drawing. Physical copy of drawing and answering in Physical OMR sheet. (FULLY OFFLINE MODE) **OR** Online drawing and answering in Onlinegoogle forms. (FULLY ONLINE MODE) **OR** Physical copy of drawing and answering in online google forms (BLANDED MODE)

**List of Soft core learning resources:**

| Unit Title | LEARNING VIDEOs |
|---|---|
| 1. Introduction. | Concept of weldability<br>https://youtu.be/4UHqL7zxVQs?si=11Qzjfe1822rnnT_<br>types of electrode<br>https://youtu.be/24UHx0dhv-Y?si=c_P7TvPzrYJ0ISvU<br>PRESSURE VESSEL FABRICATION<br>https://youtu.be/Xnje2Iq6sRI?si=Pt4WnIfZoWW7GFPz |
| 2. Drawing Interpretation | READING OF PRESSURE VESSEL DRAWING<br>https://youtu.be/-t2FYGaH5IQ?si=mgTwXi0iwOoi3A5W<br>READING OF P & ID DRAWING<br>https://youtu.be/2VLpV1dpUho?si=0OQJ2vtT6z2QNd8V<br>READING OF P & ID DRAWING<br>https://youtu.be/lBJnU1MJAts?si=i4kOFCOd8T9jLtnF<br>READING OF PFD<br>https://youtu.be/AIjl_eTWyFY?si=vHumHSL8yEyVFClI<br>DIFFERENCE BETWEEN PFD AND P&ID<br>https://youtu.be/xVQs3aAA1KY?si=0NpEhery8PS0ywEM<br>DIFFERENT TYPE OF VALVES<br>https://youtu.be/ZAB6LezNJJA?si=KJVNy8UVw2CqJ2wv |
| 3. Fabrication processes | NOZZLE ORIENTATION MARKING ON SHELL<br>https://youtu.be/fNahADYpItM?si=8hRHbF2ZSh_ysgIW<br>NOZZLE SETUP ON DISH END<br>https://youtu.be/xWOWsZvdHSc?si=ec8QTKlKpI9ig6zk<br>NOZZLE SETUP ON PRESSURE VESSEL<br>https://youtu.be/W1eohCV1kuM?si=rFb-MYqX4YwRLAYY<br>LIMPET COIL MARKING<br>https://youtu.be/KbhbyoWVyLk?si=Pcpu76kWLc5sbEs7<br>PLATE ROLLING<br>https://youtu.be/50DfkV9Y4Dk?si=Hy098E82LfDdLfSh<br>SHELL MAKING FROM PLATE<br>https://youtu.be/r9d37h-xaaw?si=2M0SB6ZjgPI3Zo6g<br>dish end manufaccturing<br>https://youtu.be/xFjdnBKoXzI?si=t8wuW0uUirkHuCgj<br>steel structure weight calculation |

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| | https://youtu.be/yI_7B6XEu9o?si=GVPh0qXRL_6fuSg4 |
| 4. Inspection and Testing | LPT<br>https://youtu.be/bHTRmTQDZzg?si=E2MWlTxpKmlg_-hl<br>MPT<br>https://youtu.be/sfjK1GZ2W9A?si=_GS7tpM4VSjgc7nB<br>UT<br>https://youtu.be/0SK250WUuNs?si=BMgZXDaEL_esaMKL<br>RT<br>https://youtu.be/2RwV4AOmM4o?si=W2-Bj5b8RBpRe7_f<br>Eddy current testing (ECT)<br>https://youtu.be/3fnVjLjDCUw?si=c7xA8t2U8OqAPZU9<br>hydro test of heat exchager<br>https://youtu.be/ph3oOGABIG4?si=cHqm7m8ZQRN7whz2<br>Helium leak testing<br>https://youtu.be/3PLN0K_tTCk?si=QT0tIk572D7KCfCg |
| 5. Surface preparation, Finishing and Coating Methods | Sand blasting<br>https://youtu.be/NBzNCB_HZlE?si=UA63Iw_4MTYeHyMQ<br>surface preparation of vessel<br>https://youtu.be/VMZXn2PHXaM?si=UMI2Ooa713i5Bk87<br>epoxy oating of structure<br>https://youtube.com/shorts/IZQH-3N9bmI?si=8cqqj-2ybH6r70FF |
| 6. Installation, erection and commissioning of process equipment | Pressure vessel equipment erection<br>https://youtu.be/bk0gygJR19E?si=QPbq1quR9_80RN0k<br>Pressure vessel equipment erection<br>https://youtu.be/zFB1-84Olfw?si=8Zwop-ZR8kjDFI8S<br>erection of steel struccture<br>https://youtu.be/PorCp4mslcI?si=QLE_K5lAsR7V8tkc<br>erection of pumps<br>https://youtu.be/CDj3HgPD5I8?si=U3n6oyB8JSy3HK9h<br>https://youtu.be/uw0T1bp4MbQ?si=8xeaQsUoPWYNNqLK<br>https://youtu.be/uw0T1bp4MbQ?si=W0hqkrwKKDN0MDU- |

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