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|  <p>Estd. 1962<br/>"A++" Accredited by<br/>NAAC(2021)<br/>With CGPA 3.52</p> | <p align="center"><b>SHIVAJI UNIVERSITY, KOLHAPUR - 416 004,<br/>MAHARASHTRA</b></p> <p align="center">PHONE : EPABX – 2609000, <a href="http://www.unishivaji.ac.in">www.unishivaji.ac.in</a>, <a href="mailto:bos@unishivaji.ac.in">bos@unishivaji.ac.in</a></p> <p align="center"><b>शिवाजी विद्यापीठ, लिहापूर - ४१६ ००४, महाराष्ट्र</b></p> <p align="center">दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दुरध्वनी विभाग ०२३१-२६०९०९३/९४</p> |  |
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SU/BOS/Sci &amp; Tech/ ४५

Date: 22/11/2022

To,

The Head,  
Departments of Technology,  
Shivaji University,  
Kolhapur.

**Subject:** Regarding New syllabi of Diploma in Plumbing Engineering (add-on Course) & Diploma in Valuation of Real Estate under Faculty of Science & Technology

Sir/Madam,

With reference to the subject mentioned above, I am directed to in form you that the university authorities have accepted and granted approval to the revised Diploma in Plumbing Engineering (add-on Course) & Diploma in Valuation of Real Estate under Faculty of Science & Technology.

This syllabus and equivalence shall be implemented from the academic year 2022-2023 onwards. A soft copy containing the syllabus is attached herewith and it is also available on university website [www.unishivaji.ac.in](http://www.unishivaji.ac.in). (Online Syllabus)

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,

  
Dy Registrar

Copy to:

|   |   |    |                           |
|---|---|----|---------------------------|
| 1 | The Dean, Faculty of Science & Technology | 7  | Computer Centre           |
| 2 | The Chairman, Respective Board of Studies | 8  | Affiliation Section (T.1) |
| 3 | Director, Examination and Evaluation      | 9  | Affiliation Section (T.2) |
| 4 | Eligibility Section                       | 10 | P.G.Admission Section     |
| 5 | O.E. – 4                                  | 11 | P.G Seminar Section       |
| 6 | Appointment Section                       | 12 | Meeting Section           |

**ADD ON DIPLOMA IN PLUMBING  
ENGINEERING**

**Submitted By**

**Department of Technology,  
Shivaji University,  
Kolhapur.**

**ACADEMIC YEAR**

**2021-2022**

**A) Preamble:**

Shivaji University, Kolhapur's Dept .of Technology has been involved in research in various aspects of technological development. Along with the time it deals with different research problems for betterment of the society & it has enabled the University to produce eminent professionals engaged in different Governmental and Non Governmental organization in the country.

The department is manned with scientists, technologists and social scientists and have well-developed infra structure to facilitate different experiments in relevant areas.

It now ventures in running a 1-year part-time (2-semesters)

Post. Diploma in plumbing Engineering. The diploma is designed by qualified personalities not only from Shivaji University but also by leading professionals and expert faculties from various noted institutions and industries of the country

**B) Academic Duration of Course:**

The duration of the course is 1 year Two Semesters in same academic year. Curriculum of first semester consists of five theory subjects where as four theory , and project in the second semester. The lectures will be delivered, two hours per Day from 5 pm to 7 pm

OR

Two full week days (Saturday & Sunday).Theses timings will be suitable for students and workings employees from industry

**C) Course structure:**

Candidates will be required to under go learning in theory, project development and workshop subjects during the academic year. Candidates also will be exposed to industrial surrounding through Industrial visits to get familiar with Plumbing Engineering.

## Diploma in Plumbing Engineering

### Course Structure Semester-I

| Sr.<br>No. | Subject                                   | Instructional Hours<br>Marks |                       | Examination    |                        |              |                |
|------------|---|------------------------------|-----------------------|----------------|------------------------|--------------|----------------|
|            |   | Theory                       | Practical/<br>Drawing | Theory<br>Exam | Internal<br>Assessment | Oral<br>Exam | Total<br>Marks |
| 1          | Plumbing Terminology& Hydraulics          | 20                           | 25                    | 50             | 25                     | 25           | 125            |
| 2          | Materials of construction and corrosion   | 20                           |                       | 50             | 25                     |              | 75             |
| 3          | Introduction to Code and Standards        | 20                           | 25                    | 50             | 25                     | 25           | 100            |
| 4          | Architectural and Structural coordination | 20                           |                       | 50             | 50                     |              | 100            |
| 5          | Computer Aided Drafting                   | 20                           |                       | 50             | 50                     |              | 100            |
|            | <b>Grand Total</b>                        | <b>100</b>                   | <b>50</b>             | <b>250</b>     | <b>172</b>             | <b>50</b>    | <b>500</b>     |

## Course Structure Semester-II

| Sr.<br>No. | Subject                               | Instructional Hours<br>Marks |                       | Examination    |                        |              |                |
|------------|---------------------------------------|------------------------------|-----------------------|----------------|------------------------|--------------|----------------|
|            |                                       | Theory                       | Practical/<br>Drawing | Theory<br>Exam | Internal<br>Assessment | Oral<br>Exam | Total<br>Marks |
| 1          | Piping layout<br>Engineering          | 20                           |                       | 50             | 25                     |              | 75             |
| 2          | Storm Drainage<br>And water<br>supply | 20                           | 25                    | 50             | 25                     |              | 75             |
| 3          | Plumbing<br>Estimation &<br>costing   | 20                           |                       | 50             | 25                     |              | 75             |
| 4          | Pumps And<br>HPS                      | 20                           |                       |                | 50                     |              | 100            |
| 5          | Project Work                          | 20                           | 25                    | 100            | 100                    |              | 150            |
|            | <b>Grand Total</b>                    | <b>100</b>                   | <b>50</b>             | <b>200</b>     | <b>225</b>             |              | <b>475</b>     |

**D) Expertise Available:**

Implementation of this type of course is new to the university; therefore very few experts from various departments of University are available to teach such course. But the experts from industrial sector, labor institute and engineering colleges can be invited for lectures. Also, some experts from National and International Institutes related to Plumbing Engineering can be invited to deliver lectures and mentor the activities

**E) Space Required:**

The course includes theory papers and industrial training. The theory part can be taught in the Department of Technology, Shivaji University, Kolhapur. The remaining part of industrial training can be completed in the industry as the project is based on Plumbing Engineering. The students have to complete it in the industry laboratory/ department's laboratory space which is required for the one year project. The department has well equipped teaching classrooms and Laboratories for the practical. A special plumbing laboratory will be established in Dot with the help of industries on CSR basis.

**F) Eligibility for admission:**

The students having science and engineering background will be eligible i.e. any 12<sup>th</sup> pass students from Science, and diploma in Engineering and Technology (Diploma in Civil/Mechanical/Chemical Engineering/Architecture approved by DTE, Maharashtra or equivalent) will be eligible.

Priority will be given to students from Shivaji University (60%) and others (40%). In case applicant number is more, the entrance test will be conducted.

**G) Examination:**

The students will be under going continuous assessment throughout the academic year through seminars, tests, tutorials etc. The evaluation will consist of internal assessment, external assessment and viva voce for the project. Passing will be as per university rules.

**H) Intake Capacity:**

Maximum 60 students in which priority will be given to the university students (60%) and others (40%).

**I) Fee Structure:**

| Particulars    | Annual Fees Rs. For Non DOT Students | Annual Fees Rs. For DOT Students |
|----------------|--------------------------------------|----------------------------------|
| Tuition Fee    | 15000.00                             | 10000.00                         |
| Laboratory Fee | 5000.00                              | 5000.00                          |
| <b>Total</b>   | <b>20000.00</b>                      | <b>15000.00</b>                  |

Other fee will be applicable as per university rule/norms.

### **Annexure- I**

#### **Budget: Non-recurring (e .g .Equipments, Accessories etc.)**

| <b>Sr. No.</b>      | <b>Item</b>           | <b>First Year</b> | <b>Total in Rs.</b> |
|---------------------|-----------------------|-------------------|---------------------|
| 1                   | Models and Charts     | 50000.00          | 50000.00            |
| 2                   | Equipments/Software's | 200000.00         | 200000.00           |
| <b>Total in Rs.</b> |                       |                   | <b>250000.00</b>    |

### **Annexure- II**

#### **Man Power:**

| <b>Sr. No.</b> | <b>Item</b>   | <b>Consolidated Emolument</b> | <b>Total in Rs.</b> |
|----------------|---|-------------------------------|---------------------|
| 1              | Teaching Assistance   | Rs. 8000/month                | 96000.00            |
| 2              | Course Co-ordinator   | Rs. 15000/month               | 180000.00           |
| 3              | Honorarium to contributory teachers, industrial experts and T.A. (Rs. 600 x 200 lecture)                          |                               | 120000.00           |
| 4              | Honorarium to contributory teachers, industrial experts and T.A (Rs. 300 x 100 demonstrations, visit to industry) |                               | 30000.00            |
| <b>Total</b>   |   |                               | <b>426000.00</b>    |

### **Annexure-III**

#### **Miscellaneous:**

| <b>Sr. No.</b> | <b>Budget Head</b> | <b>Total in Rs.</b> |
|----------------|--------------------|---------------------|
| 1              | Stationary         | 10000.00            |
| 2              | Miscellaneous      | 10000.00            |
| <b>Total</b>   |                    | <b>20000.00</b>     |

#### **Total Budgetary provisions for the first year will be**

| <b>Sr. No.</b>   | <b>Budget Head</b>     | <b>Total in Rs.</b> |
|------------------|------------------------|---------------------|
| 1                | Total of Annexure-I    | 250000.00           |
| 2                | Total of Annexure-II   | 426000.00           |
| 3                | Total of Annexure- III | 20000.00            |
| <b>Total Rs.</b> |                        | <b>696000.00</b>    |

Note: Draft Syllabus Attached.

## Course Structure and Scheme of Evaluation

### Course Structure: Semester I

#### SYLLABUS

#### 1. Plumbing Terminology and Hydraulics

Theory - 20Hrs

Theory Exam. - 50 Marks

Internal Assessment- 25 Marks

Oral Exam-25 Marks

This topic covers the terminology of trade. Definitions for most words can be found in a dictionary, but there are technical or trade terms which take on specific meaning when used in relation to plumbing. The purpose of this course is to define those terms for the student. Source materials for this course is available in illustrated training manual. Understanding of plumbing terminology will provide the student with insight in to the development of the art of plumbing. A list of abbreviations associated with the trade is included in this course.

A brief revision covering friction factor, pressure drop for flow of non-compressible and compressible fluids (Newtonian Fluids), pipe line sizing, economic velocity.

Pipeline networks and their analysis for flow in branches, restriction orifice sizing.

Non-Newtonian fluids – types with examples, pressure drop calculations for Non-Newtonian fluids.

**Assignment:** Numerical exercise in line sizing

#### 2. Materials of Construction and corrosion:

Theory - 20Hrs

Theory Exam. - 50 Marks

Internal Assessment- 25 Marks

Oral Exam-25 Marks

Desirable properties of piping materials, materials for low, normal and high temperature services, materials for corrosion resistance. Common ASTM and IS specifications for : Seamless / ERW pipes, pipe fittings, flanges, and fasteners, materials for valves.

**Gaskets :** Function and properties, types of gaskets and their selection. Polymeric materials (Plastics), important considerations for plastic pipe lines (HDPE, PP. PVC etc.) Joining methods for plastic pipes and fittings. Valves made out of plastics, constructional features, and limitations.

**Corrosion:** Types of corrosion, methods of preventing corrosion, coating of pipelines for underground and long distance services, cathodic protection of pipelines.

**Painting of Pipelines:** Common paints for corrosion protection, abrasive cleaning and painting of pipelines. Pickling and passivation of S.S. piping.



### **3.Introduction to Code and Standards**

**Theory-20Hrs**

**Theory Exam.- 50Marks**

#### **Internal Assessment- 25 Marks**

This topic will provide the student with a better understanding of the development, roles and uses of codes and standards in the construction industry. Source material for this course is available in Illustrated Training Manual.

Approvals Authority Having Jurisdiction (AHJ), alternative materials, minimum standards, sewers required, industrial wastes, workman, prohibited fittings and practices, water conveyance , protection of pipes and structure, water proofing, rat proofing, Hangers and supports, trenching, types of joints

### **4. Architectural and Structural coordination**

**Theory-20 Hrs**

**Theory Exam.- 50Marks**

#### **Internal Assessment- 50 Marks**

This topic deals with various architectural and structural provisions to be made during the planning stage. Few selected cases shall be discussed. Many standard text books in architecture and engineering by reputed author are available as source material Specific focus on plumbing activities is required. A site visit with the faculty is essential.

Local municipal laws relating to plumbing and basic information on fire static water requirements, for various sanitary facilities, plumbing shafts water tanks and pumps room, centralized hot water system coordination with the architects. Structural parameters such as sunk outlets, location of columns and beams post-tension slabs, importance of ledge walls.

### **5. Computer Aided Drafting**

**Theory-20 Hrs**

**Theory Exam.- 50Marks**

#### **Internal Assessment- 50 Marks**

A brief review of computer hardware and software required for interior architectural applications. Working in AUTOCAD for preparing drawings including plans, elevations and sections. Construction of models: working in 3D to construct wireframe modeling, surface modeling, solid modeling etc.

## **SEMESTER – II**

### **1. Piping Layout Engineering:**

**Theory-20 Hrs**

**Theory Exam.- 50Marks**

**Internal Assessment- 25 Marks**

Introduction Equipment Layout

1. Typical piping systems layout considerations for following various systems. Distillation systems and heat exchanger systems. Cooling water, process water, chilled water/ brine systems. Pumps, air compressor suction / discharge piping. Condensate cycle, steam distribution. Gas / steam turbines, vacuum system and flare lines. Yard piping jacketed and traced lines, class A,B,C including LPG Fire fighting system. Selection and design considerations for hoses, strainers, sight glasses, TSVs, rubber and metallic expansion bellows. Information to and from piping departments with other engineering departments in reference to layouts preparation. Do's and Don'ts for routing of pipelines in consideration with operating feasibility.

### **2. Storm Drainage and water supply**

**Theory-20 Hrs**

**Theory Exam.- 50Marks**

**Internal Assessment- 25 Marks**

This topic provides the guidelines to collect/capture the storm water and discharge it in a safe and efficient manner. Source material for this course is available in Illustrated Training Manual. Storm Drains required, prohibited connection, subsoildrains, sub-drains, sizing of gutters/channels/ scuppers, window are away drains, roof drains, strainers, leaders, conductors and connections, siphonic drains, under-ground drains, materials, traps required, prohibited installations, sizing, testing, introduction to rain water harvesting.

This topic will introduce students to the regulation related to potable and non-potable water supply and distribution systems. Topics discussed include potable water storage, sizing of portable water piping, and drinking water treatment units. Source material for this course is available in Illustrated Training Manual. Demonstration of various pipe manufacturers could be part of practicals.

Preamble, source of water, potable and non-potable and non-portable water, reclaimed water, water storage, treatment, hot and cold water distribution system, back flow prevention, air gap, cross connection control, pipematerials and jointing methods, pressure control, pipematerials and jointing method, pressure controls unions, thermal expansion, type of valves ,installation and testing disinfection, water supply fixture Units (WSFU), sizing, protection of underground pipes ,color codes and arrow making.

### **3. Plumbing Estimation & Costing**

**Theory-20 Hrs**

**Theory Exam.- 50Marks**

**Theory Exam.- 50 Marks**

**Internal Assessment-25 Marks**

Direct and indirect costs associated with plumbing, estimating requirement of consumables and man hours, relative economics of various materials of construction, relative economics for different systems, concept of economic plumbing Diameter. Case study in optimizing pipe size and estimating cost of piping for yard piping and ISBL piping. Direct and indirect costs associated with piping fabrication and installation and testing inch-dia, inch- m concepts.

#### **Assignment:**

Estimation of material cost, inch-m, inch-dia, cost of fabrication, installation of one pipeline isometric.

### **4. Pumps And Hydro**

**Theory -20 Hrs**

**Theory Exam-50 Marks**

**Internal Assessment-50 Marks**

This topic covers various types of pumps for water supply, heat exchangers, wastewater dewatering and sewage. Pressure boosting and hydro-pneumatic systems shall be elaborated along with the accessories and controls. Design of Pumps, calculating pump capacities will be studied. Expert guest speaker can be requested to cover this topic.

### **5.ProjectWork**

**Theory-20 Hrs**

**Practical/Drawing-25Hrs**

**Oral Exam.- 50 Marks**

**Internal Assessment--100 Marks**

Students are allowed to select the topic of their project work subject to approval of the scope by the faculty. Maximum 4 students can work in group for a common topic. Students are expected to visit the site, shops, etc. They can discuss the topic with manufactures, owners, consultant, contractor, and plumbers. The project report comprising drawing, sketches, photographs and description must be elaborate to cover the topic in its entirety. The Drawing should specify sizing and pump capacities and the report should be type written. The oral examination based on the project work submitted, shall be conducted in the presence of an external examiner.

**Criteria for Passing:**

1. A minimum of 40 % marks should be obtained to pass each to the subjects head.
2. A ward of diploma will be governed by the following
  - a)Gross percentage of marks70 or above is Distinction.
  - b)Gross percentage between 60 or above and below 70 is first-class.
  - c)Gross percentage between 50 or above and below 60 is second-class.
  - d)Gross percentage between 40 and above and below 50 is pass class.

**Nature of Question Paper:**

It will be as follows:

1. a)Duration is two hours.
  - b) Total no of questions will be five out of which three to be solved.
2. Q 1 is compulsory. Total weightage of marks 20 for the question andit consists of short answers type questions covering all topics of the subject syllabus.
3. Out of remaining two questions for the weightage of thirty marks, approximately 50 % questions must be of analytical nature.