

**MAHARASHTRA STATE BOARD OF VOCATIONAL EDUCATION EXAMINATION, MUMBAI - 51**

| 1        | Name of Course                         | <b>Certificate Course In Modern Construction Techniques &amp; Management (304113)</b>  |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
|----------|--|--|-------|-------|------------|------------|--|---------|------------|-----------------|----------|----------|------------|------------|---|----------|---|------|-------|-----|----|---|----------|--|------|-------|-----|----|---|----------|---|-------|-------|-----|-----|--|--|--------------|--|--|------------|------------|
| 2        | Max. Nos. of Student                   | 25 Students  |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 3        | Duration                               | 6 Month  |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 4        | Type                                   | Full Time  |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 5        | Nos. Of Days / Week                    | 6 Days   |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 6        | Nos Of Hours /Days                     | 7 Hrs  |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 7        | Space Required                         | Laboratory = 1000 Sq feet<br>Class Room = 200 Sq feet<br><b>TOTAL = 1200 Sq feet</b>   |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 8        | Entry Qualification                    | <b>S.S.C.+ Any Course in Civil Group of MSBVEE</b>   |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 9        | Objective Of Syllabus/<br>introduction | Awareness of Safety precautions<br>Knowledge of Engineering skill, use of tools in Construction.<br>Awareness of Architecture.<br>Awareness of Basic quantity Surveying<br>Awareness of Basic Building Construction.   |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 10       | Employment Opportunity                 | The trainee will either to be able to take up jobs with agencies which Maintain Develop and repair Modern Construction Techniques & Management or with working experience will be in a position to start his own independent Business.   |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 11       | Teacher’s Qualification                | Diploma or Degree Civil Engineering.   |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 12       | Training System                        | <b>Training System Per Week</b> <table><tr><td>Theory</td><td>Practical</td><td>Total</td></tr><tr><td>12 Hours</td><td>30 Hours</td><td>42 Hours</td></tr></table>  |       |       |            |            |  | Theory  | Practical  | Total           | 12 Hours | 30 Hours | 42 Hours   |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| Theory   | Practical                              | Total  |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 12 Hours | 30 Hours                               | 42 Hours   |       |       |            |            |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 13       | Exam. System                           | <table><tr><th>Sr. No.</th><th>Paper Code</th><th>Name of Subject</th><th>TH/PR</th><th>Hours</th><th>Max. Marks</th><th>Min. Marks</th></tr><tr><td>1</td><td>30411311</td><td>Modern Construction Techniques &amp; Management</td><td>TH-I</td><td>3 hrs</td><td>100</td><td>35</td></tr><tr><td>2</td><td>30411321</td><td>Basic Building Construction &amp; Carpentry.</td><td>PR-I</td><td>3 hrs</td><td>100</td><td>50</td></tr><tr><td>3</td><td>30411322</td><td>Modern Construction Techniques &amp; Management</td><td>PR-II</td><td>6 hrs</td><td>200</td><td>100</td></tr><tr><td></td><td></td><td><b>TOTAL</b></td><td></td><td></td><td><b>400</b></td><td><b>185</b></td></tr></table> |       |       |            |            |  | Sr. No. | Paper Code | Name of Subject | TH/PR    | Hours    | Max. Marks | Min. Marks | 1 | 30411311 | Modern Construction Techniques & Management | TH-I | 3 hrs | 100 | 35 | 2 | 30411321 | Basic Building Construction & Carpentry. | PR-I | 3 hrs | 100 | 50 | 3 | 30411322 | Modern Construction Techniques & Management | PR-II | 6 hrs | 200 | 100 |  |  | <b>TOTAL</b> |  |  | <b>400</b> | <b>185</b> |
| Sr. No.  | Paper Code                             | Name of Subject  | TH/PR | Hours | Max. Marks | Min. Marks |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 1        | 30411311                               | Modern Construction Techniques & Management  | TH-I  | 3 hrs | 100        | 35         |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 2        | 30411321                               | Basic Building Construction & Carpentry.   | PR-I  | 3 hrs | 100        | 50         |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
| 3        | 30411322                               | Modern Construction Techniques & Management  | PR-II | 6 hrs | 200        | 100        |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |
|          |  | <b>TOTAL</b>   |       |       | <b>400</b> | <b>185</b> |  |         |            |                 |          |          |            |            |   |          |   |      |       |     |    |   |          |  |      |       |     |    |   |          |   |       |       |     |     |  |  |              |  |  |            |            |

# SYLLABUS

## Modern Construction Techniques & Management

| Practical - II   | Theory - I   |
|--|--|
| <ul style="list-style-type: none"> <li>• Visits to constructions sites</li> <li>• Prepare a report on the application of new techniques</li> </ul>   | <ul style="list-style-type: none"> <li>• Overview of modern techniques in different areas of constructions</li> <li>• Applications of techniques in construction industry</li> <li>• Career opportunities in construction sector</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Prepare list of material &amp; tools required</li> <li>• Prepare table of specifications of different items of work</li> <li>• Set layout according to plan</li> </ul>  | <ul style="list-style-type: none"> <li>• Notations, conventions &amp; symbols used</li> <li>• Interpretation of a given drawing</li> <li>• Specifications &amp; dimensions</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Batch materials using different methods</li> <li>• Prepare concrete by hand mixing and using mixer</li> <li>• Use vibrator for compaction</li> <li>• Prepare concrete using admixtures and construction chemicals</li> <li>• Remove form work</li> <li>• Use power tools in different operations</li> <li>• Observe safety precautions in all operations</li> </ul> | <ul style="list-style-type: none"> <li>• Batching of material</li> <li>• Hand mixing &amp; machine mixing</li> <li>• Transportation of concrete</li> <li>• Placing of concrete</li> <li>• Compaction of concrete</li> <li>• Curing of concrete</li> <li>• Finishing of concrete</li> <li>• Stripping of form work</li> <li>• Application of Power tools</li> <li>• Safety precautions</li> </ul> |
| <ul style="list-style-type: none"> <li>• Prepare mortar of given ratio</li> <li>• Lay stone &amp; brick masonry in different bonds</li> <li>• Use various tools &amp; instruments for different operations</li> <li>• Observe safety precaution in masonry work</li> </ul>   | <ul style="list-style-type: none"> <li>• Definitions of terms</li> <li>• Types of masonry</li> <li>• Different types of bonds</li> <li>• Material used in different masonry</li> <li>• Use of tools and instruments</li> <li>• Ingredients of mortar</li> <li>• Preparation of mortar using different ratios of materials</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Set work layout, mark center line &amp; size of excavation</li> <li>• Lay PCC (bad concrete) in foundation</li> <li>• Prepare foundation according to given specifications</li> <li>• Fix cover to the reinforcement</li> <li>• Fix shoring in a foundation</li> <li>• Observe safety precautions</li> </ul>  | <ul style="list-style-type: none"> <li>• Definitions of common terms</li> <li>• Setting out of work layout</li> <li>• Different types of foundation &amp; applications</li> <li>• Plain cement concrete (PCC)</li> <li>• Reinforced cement concrete (RCC)</li> <li>• Shoring</li> <li>• Form work in foundation</li> <li>• Laying foundation</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Lay damp proof course using different materials and provide termite treatment</li> </ul>  | <ul style="list-style-type: none"> <li>• Terms &amp; definitions</li> <li>• Different materials used</li> <li>• Laying damp proof course using different materials</li> <li>• Termite treatment</li> </ul>   |

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|--|---|
| <ul style="list-style-type: none"> <li>• Erect scaffolding &amp; form work using safety measures</li> </ul>  | <ul style="list-style-type: none"> <li>• Definitions of common terms</li> <li>• Types &amp; applications</li> <li>• Different materials used in form work</li> <li>• Safety precautions to be observed in scaffolding</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Perform casting operations</li> </ul>   | <ul style="list-style-type: none"> <li>• Definitions of terms</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Fix different frames in masonry work</li> </ul>   | <ul style="list-style-type: none"> <li>• Casting of footings, column, beam, lintels, stair &amp; roof, fixing of frame</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Prepare surface for plastering</li> <li>• Perform plastering operation at different surface</li> <li>• Perform rendering &amp; wall cladding</li> <li>• Use of modern gadgets</li> </ul>  | <ul style="list-style-type: none"> <li>• Definition of common terms</li> <li>• Methods of plastering</li> <li>• Different materials used in plastering</li> <li>• Surface preparation</li> <li>• Rendering</li> <li>• Wall cladding, defects in plaster</li> <li>• Methods of checking plaster using modern instruments</li> <li>• Method of de-plastering by use of power tools</li> </ul> |
| <ul style="list-style-type: none"> <li>• Select material for different types of flooring</li> <li>• Lay floor of different types using different material and given instructions</li> <li>• Finish floor surface using different techniques</li> <li>• Measure dimensions and slope</li> </ul> | <ul style="list-style-type: none"> <li>• Meaning of terms</li> <li>• Different material used in flooring</li> <li>• Different types of flooring</li> <li>• Tools &amp; instruments for flooring</li> <li>• Criteria for laying floors</li> <li>• Grinding &amp; polishing of floor</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Use various precasted elements in construction</li> </ul>   | <ul style="list-style-type: none"> <li>• Use of precasted foundation system</li> <li>• Wall panels</li> <li>• Column</li> <li>• Beam</li> <li>• Roof</li> <li>• Mobile toilets</li> <li>• Masonry block</li> <li>• Paving block</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>• Management of man, materials, machines with economy</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Preparation of approximate and detailed estimate</li> </ul>   | <ul style="list-style-type: none"> <li>• Need and importance</li> <li>• Types of estimates – approximate and detailed estimates</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Fill in the forms</li> </ul>  | <ul style="list-style-type: none"> <li>• Measurement</li> <li>• Sheet</li> <li>• Calculation of quantities</li> </ul>   |
| <ul style="list-style-type: none"> <li>• Take measurement of various items from a constructed building</li> </ul>  | <ul style="list-style-type: none"> <li>• Measurement of items</li> </ul>  |
| <ul style="list-style-type: none"> <li>• Read and interpret CSR</li> </ul>   | <ul style="list-style-type: none"> <li>• General specification</li> <li>• Detailed specifications</li> </ul>  |
|  | <ul style="list-style-type: none"> <li>• Calculate the quantities of various items</li> </ul>   |
|  | <ul style="list-style-type: none"> <li>• Methods of rate analysis for material, labour, machinery</li> </ul>  |

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|--|---|
| • Prepare estimates for common construction and maintenance work |   |
|  | <ul style="list-style-type: none"> <li>• Factor affecting construction</li> <li>• Methods of overcoming constraints</li> <li>• Methods of planning for overcoming constraints</li> </ul>          |
| • Layout exercise for water supply and sanitation                | <ul style="list-style-type: none"> <li>• Need and importance of water supply and sanitation</li> <li>• Methods of layout</li> </ul>   |
| • Take measurements for wiring purpose                           | <ul style="list-style-type: none"> <li>• Types of wiring</li> <li>• Identification of different components and accessories</li> <li>• Regulations, safety</li> <li>• Testing procedure</li> </ul> |

### List of Equipment, Tools And Instruments

| Sr. No. | Item/ Specification                       | Quantity Proposed For A Batch Of 25 Trainees |
|---------|---|--|
| 1       | Steel taps (3 meter)                      | 10   |
| 2       | Steel taps (15 meter)                     | 8  |
| 3       | Steel taps (30 meter)                     | 4  |
| 4       | Masons square 300 x 600                   | 8  |
| 5       | Marking rope & thread (15 m)              | 64 each                                      |
| 6       | Bevel                                     | 8  |
| 7       | Shovel                                    | 10   |
| 8       | Pan (M.S. or PVC)                         | 10   |
| 9       | Mortar board (2000 x 2000)                | 2  |
| 10      | Measuring box (35 ltr. Capacity)          | 4  |
| 11      | Plumb rule and Bob                        | 8  |
| 12      | Spirit level                              | 8  |
| 13      | Straight edge                             | 8  |
| 14      | Water tube (6 m)                          | 8  |
| 15      | Bucket (5 ltr. & 10 ltr.)                 | 8 each                                       |
| 16      | Trowel (required shape & sizes)           | 8 set  |
| 17      | Concrete mixer                            | 2  |
| 18      | Concrete vibrator (pin type & plate type) | 2 each                                       |
| 19      | Drop chute                                | 4  |
| 20      | Compaction tools (durmut)                 | 4  |
| 21      | Water drum 200 ltr.                       | 4  |
| 22      | Bar bending table                         | 8  |

## Basic Building Construction Basic Carpentry

| Practical - I   |
|---|
| Introduction with buildings about different parts of the building and draw a neat sketch passing thro' door, window, and roof of multi stories building, orientation and ventilation of building.   |
| Introduction by showing the different types of materials i.e. bricks, stones, tiles, cement, sand, aggregates, lime, steel, timber, earthen ware, Standard size of local market bricks available in your locality, site visit of brick kiln showing the manufacturing of bricks, field test of cement. Etc. |
| Construction of different types of foundation, Layout of foundation plan on the ground, reading of map, laying of concrete in foundation, ratio of foundation concrete. Transfer of center line with Plumb Bob in the excavated trench, laying of D.P.C.  |
| Tools of Brick masonry, how to use the tools of brick masonry, construction of wall and corner junction of wall in super structure and foundation in English Bond and Flemish Bond, Stretcher Bond, Header Bond in pillars and walls etc. Zig-Zag Bond, Hearing Bone Bond in Brick flooring etc             |
| Centering and Shuttering of different types of Arches, Construction of Arches and construction of different types of Roofs, laying of Reinforcement of RCC flat Roof and Reinforced Brick Slab Roof, Terracing of roof, First and second class mud Roof, Jack Arch Roofs, its method of construction.       |
| Construction of all types of floors, making of formation level, laying of Base Layers, laying of Topping, etc.  |
| Surface plastering ½" (12.5 mm to 20 mm) thick in various ratios of cement and mortar. Ceilings plaster, Curing of plaster.   |
| White Washing, three coats for new plastered surface, colour wash, lime paint, cement paints, applying enamel paints to the wood work, Steel work, etc. including primary coat.   |
| Importance of the subject introduction with workshop safety precautions, fire fighting equipments etc.  |
| Identification of hand tools demonstration and using measuring, sawing practice using different types of saws, and planes etc.  |
| Ripping , cross cutting , curve cutting , oblique sawing .use of sawhorse , bench hook , Bench vice , Bench stop etc , Identification of timber , showing defects knots , shakes , grains etc .   |
| Planning practice: planning face side , face edge marks use , of marking gauge etc , testing of accuracy flatness , twist ness of surface . use of straight edge bench stop , try square , cross planning , edge planning , planning piece of size , grinding , sharpening of plan blade etc .              |
| Demonstration and making of joints. Framing joints: halving joints, trenching, housing joints, mortised and tanon joint , Door joint , bridle joint , dovetail joint , lap dovetail joint , miter joint etc.  |
| Broadening joint: simple butt, slot screw joint, pocket screw joint, tongue and groove butt joint, etc.   |
| Lengthening joints: slopping scarf, racking scared, half lapping scarf , table scarf joint etc.   |

**List of Tools And Equipments**  
**Basic Carpentry**

| Sr. No. | Description  | Quantity |
|---------|--|----------|
| 1       | Flexible tape rule steel (3 meter)                           | 10       |
| 2       | Try Square (20 mm)   | 10       |
| 3       | Square bevel   | 10       |
| 4       | Marking Gauge (Wooden)                                       | 10       |
| 5       | Hand Saw 450 mm  | 10       |
| 6       | Saw tenon 300 mm   | 10       |
| 7       | Jack plane metal 335 mmx 50 mm cutter                        | 10       |
| 8       | Plane smoothing metal 250 mmx 50 mm cutter                   | 10       |
| 9       | Chisel firmer (bevel edge) 6, 10, 15, 20, 25mm with (5 nos.) | 10       |
| 10      | Chisel mortise 6,10,15, (3nos)                               | 10       |
| 11      | Screw driver (300 mm)  | 10       |
| 12      | Wooden mallet (medium size)                                  | 10       |
| 13      | Hammer claw (500gms)   | 10       |
| 14      | Carborandum stone (200x 50x 25mm)                            | 10       |
| 15      | Hand brush for bench cleaning (400mm)                        | 10       |
| 16      | Screw Driver 250 mm  | 04       |
| 17      | Pincer 50mm  | 04       |
| 18      | File Half Round 2nd Cut 250mm                                | 08       |
| 19      | File half wood rasp bastard 300mm                            | 08       |
| 20      | File slim taper 100 mm                                       | 08       |
| 21      | Card File (Steel) wire brush for file                        | 08       |
| 22      | Electrically operated motorized cutter                       | 4        |