

Syllabus for the subject

of

# **WORKSHOP CALCULATION & SCIENCE**

(For 1<sup>st</sup> & 2<sup>nd</sup> semester)

Under

**CRAFTSMEN TRAINING SCHEME (CTS)**

(For all Engineering Trades with 8<sup>th</sup> pass entry qualification)

Designed

in

- 2015 -

By

**Government of India  
Ministry of Skill Development & Entrepreneurship  
Directorate General of Training  
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE  
Block - EN - 81 SECTOR – V, SALT LAKE CITY,  
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## **A. RATIONALE**

Core skills enhance knowledge, Analytical ability, problem solving ability, understanding or comprehending drawings & designs and also enriches on scientific principles. At the same time it creates the base for achieving hard skills. To carry out any skill related task the know how about basic science & related calculation is essential as it helps in scientific way of executing the task.

Presently the employers want not only simple execution of assigned task but also give weightage on Innovative ideas in work place along-with problem solving. A person can stimulate innovative ideas and solve problems if he possesses basic core skill such as (Calculation and Science). More importantly the productivity of a person also enhances and gives confidence to person to perform task competently.

Recognizing this importance the core skills (Workshop Calculation and science) made an integral part of all Engineering Trade run under NCVT. The content of Workshop Calculation and science is common for 1st & 2nd semesters for all Engineering Trades with 8th pass entry qualification.

## **B. GENERAL INFORMATION**

1. **Name of the subject** : **WORKSHOP CALCULATION & SCIENCE**
2. **Applicability** : CTS- For all engineering trades with 8th pass entry qualification  
ATS- For all engineering trades with 8<sup>th</sup> pass entry qualification
3. **Hours of Instruction** : 44 Hrs for 1<sup>st</sup> semester  
42 Hrs for 2<sup>nd</sup> semester
4. **Examination** : The examination for the subject will be held at the end of each semester.
5. **Marks Distribution** :

	Full marks
Examination	75
Sessional	10
TOTAL	85

6. **Instructor Qualification** : Degree in Engineering with one year experience.  
**OR**  
Diploma in Engineering with two years experience.
7. **Desirable** : Craft Instructor Certificate in RoD & A course under NCVT.
8. **Instructor Requirement** : One full time instructor is required for 144 seats and additional instructor(s) will be required on increase in every 144 seats. For seats less than 144, the instructor may be out sourced/ hired on contract basis.

### C. ALLOTMENT OF TIME AMONG THE TOPICS

	<u>Workshop Calculation</u>		<u>Workshop Science</u>	
To be covered in	Topics	Allotted time in Hours	Topics	Allotted time in Hours
First semester	Unit	04	Material Science	16
	Basic Mathematics	06	Mass, Weight and Density	06
	Conversion	04		
	Ratio & Proportions	04		
	Percentage	04		
	<b>Sub Total:</b>	<b>22</b>	<b>Sub Total:</b>	<b>22</b>
Second semester	Basic Algebra	08	Heat and Temperature	06
	Mensuration	13	Basic Electricity	09
			Stress & strain	06
	<b>Sub Total:</b>	<b>21</b>	<b>Sub Total:</b>	<b>21</b>

## D. DETAILS OF SYLLABUS

### 1<sup>st</sup> Semester – 44 hrs. Duration

Calculation -22 hrs.			Science – 22 hrs.		
Sl. No.	Description	Hrs.	Sl. No.	Description	Hrs.
1	<b>Unit:</b> Systems of unit- FPS, CGS, MKS/SI unit, Unit of length, Mass and time. Conversion of units.	4	1	<b>Material Science :</b> Definition, properties (physical & mechanical) and uses of Metal, Non-metal, Alloy & Insulator. Types of ferrous and Non-ferrous metals. Difference between Ferrous and Non-Ferrous metals.	16
2	<b>Basic Mathematics</b> - BODMAS rule Fraction-Addition, Subtraction, multiplication and Division-Problem solving, Decimal-Addition. Simple calculation using Scientific Calculator.	6	2	<b>Mass, Weight and Density:</b> 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.	6
3	Conversion of Fraction to Decimal and vice-versa.	4			
4	<b>Ratio &amp; Proportion:</b> Simple calculations & related problems solving.	4			
5	<b>Percentage:</b> Introduction, Simple calculation. Changing percentage to fraction and decimal & vice-versa.	4			

## 2nd Semester – 42 hrs Duration

Calculation -21 hrs.			Science – 21 hrs.		
Sl. No.	Description	Hrs.	Sl. No.	Description	Hrs.
1	<b>Basic Algebra:</b> Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	8	1	<b>Elasticity:</b> Elastic & Plastic material. Stress & strain and their units. Young's modulus. Ultimate stress and breaking stress.	6
2	<b>Mensuration :</b> Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle,  Volume of solids – cube, cuboid, cylinder and Sphere.  Surface area of solids – cube, cuboid, cylinder and Sphere.	13	2	<b>Heat &amp; Temperature:</b> Heat and temperature, their units, difference between heat and temperature, boiling point, melting point,  Scale of temperature, relation between different scale of temperature.  Thermometer, pyrometer.  Transmission of heat, conduction, convection, radiation.	6
			3	<b>Basic Electricity:</b> Introduction and use of Electricity.  AC, DC & their comparisons. Current, Voltage, Resistance & their units.  Power, Energy & their units.  Insulator and conductors & their uses.	9