Syllabus for the subject

of

WORKSHOP CALCULATION & SCIENCE

(For 1st & 2nd semester)

Under

CRAFTSMAN TRAINING SCHEME (CTS)

(For all Engineering Trades)

Re-Designed

in

– 2014 -

By

Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
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CONTENTS

A	Rationale	3
B	General Information	4
C	Allotment of time and marks	5
D	Details of Syllabus	6

A. <u>**RATIONALE**</u>

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 wants 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.

Recognising 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 first two semesters for all Engineering Trades having more than two semesters. The content of 3rd & 4th semester is made specific to trade to fulfill the requirement of each trade.

B. <u>**GENERAL INFORMATION**</u>

1. **Name of the subject** : **WORKSHOP CALCULATION & SCIENCE**

2. **Applicability :**

   - CTS- For all engineering trades
   - ATS- For all engineering trades

3. **Hours of Instruction:** 44 Hrs for 1st semester

   42 Hrs for 2nd semester

4. **Examination:** The examination for the subject will be held at the end of each semester.

5. **Marks Distribution :**

	Full marks	Pass Marks
Examination	50	20
Sessional	10	4
TOTAL	60	24

6. **Instructor Qualification:** Degree in Engineering with two years experience **OR**
   Diploma in Engineering with one year experience

7. **Desirable:** Craft Instructor Certificate in RoD & A course under NCVT.

8. **Instructor:**
   - One full time instructor is required for 1000 seats and above
   - For seats less than 1000, the instructor may be out sourced/ hired on contract basis.

c. ALLOTMENT OF TIME AND MARKS AMONG THE TOPICS

To be covered in	Workshop Calculation			Workshop Science			TOTAL MARKS FOR EXAM.	SESSIONAL	GRAND TOTAL
	Topics	Allotted time in Hours	Marks Allotted	Topics	Allotted time in Hours	Marks Allotted			
First semester	Unit	04	05	Metals	10	10			
	Fractions	06	05	Mass, Weight and Density	04	05			
	Square root	04	05	Work, Power and Energy	04	05			
	Ratio & Proportions	04	05	Speed and Velocity	04	05			
	Percentage	04	05						
	SUB TOTAL:	22	25	SUB TOTAL:	22	25	50	10	60
Second semester	Algebra	06	10	Heat and Temperature	06	10			
	Mensuration	11	10	Basic Electricity	09	07			
	Trigonometry	04	05	Levers and Simple Machines	06	08			
	SUB TOTAL:	21	25	SUB TOTAL:	21	25	50	10	60

D. DETAILS OF SYLLABUS

1st Semester – 44 hrs. Duration

Calculation -22 hrs.				Science – 22 hrs.			
Week No.	Description	Hrs.	Mark	Week No.	Description	Hrs.	Mark
1	**Unit**: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	4	05	1	**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, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.	10	10
2	**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.	6	5	2	**Mass ,Weight and Density** : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals.	4	5
3	**Square Root** : Square and Square Root, method of finding out square roots, Simple problem using calculator.	4	5	3	**Speed and Velocity**: Rest and motion, speed, velocity, difference between speed and velocity, acceleration, retardation, equations of motions, simple related problems.	4	5
4	**Ratio & Proportion** : Simple calculation on related problems.	4	5	4	**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.	4	5
5	**Percentage** : Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.	4	5				

2nd Semester – 42 hrs Duration

Calculation -21 hrs.				Science – 21 hrs.			
Sl. No.	Description	Hrs.	Mark	Sl. No.	Description	Hrs.	Mark
1	**Algebra** : Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).	6	10	1	**Heat & Temparature**: 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	10
2	**Mensuration :** 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.	11	10	2	**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.	9	7
3	**Trigonometry:** Trigonometrical ratios, measurement of angles. Trigonometric tables	4	5	3	**Levers and Simple Machines:** levers and its types. Simple Machines, Effort and Load, Mechanical Advantage, Velocity Ratio, Efficiency of machine, Relationship between Efficiency, velocity ratio and Mechanical Advantage.	6	8