

Syllabus for the subject

of

# **WORKSHOP CALCULATION & SCIENCE**

(For 3rd & 4th semester)

Under

**CRAFTSMEN TRAINING SCHEME (CTS)**

(For Mechanic Mechatronics)

**Re-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, KOLKATA - 700 091**

**Syllabus for Workshop Science and Calculation  
Mechanic Mechatronics  
3<sup>rd</sup> Semester**

<b>Calculation</b>			<b>Science</b>		
<b>Sl. No.</b>	<b>Description</b>	<b>Hrs.</b>	<b>Sl. No.</b>	<b>Description</b>	<b>Hrs.</b>
1	<b>Forces</b> -Composition and resolution, spring force, moment and torque.	21	1	<b>Plastic overview:</b> Thermoplastics, thermoset, and plastic processing	21
2	<b>Strength of material</b> -stress, strain, yield strength and cross sectional area calculation, factor of safety		2	<b>Use of data handbook (Westermann table)*</b> -Graph interpretation, Raw material standard sizes, material composition, properties	
3	<b>Screw joint calculation</b> - Screws and nuts, tightening torque		3	Tensile strength of screws, tightening torques	
4	<b>Sheet Metal</b> - Bending length calculations		4	<b>Limit, fits and tolerance</b>	
5	<b>Power transmission</b> - Belt, gear and chain, calculation of speed, velocity ratio, torque		5	Gear terminology, gear trains, velocity ratio, mechanical advantage and power screws.	
6	<b>Estimation and costing:</b> Calculation of machining time, machining cost, material cost, labour cost & total cost		6	<b>Estimation and costing basics:</b> Elements of cost, direct & indirect cost, fixed & variable	

\*Scientific calculator and data book may be made available for 3rd and 4th semester.

**Syllabus for Workshop Science and Calculation  
Mechanic Mechatronics  
4th Semester**

Calculation			Science		
Sl. No.	Description	Hrs.	Sl. No.	Description	Hrs.
1	<b>Automation:</b> Calculation of pressure, forces, flow rate, cylinder force, speed and air consumption PSI, bar, atmospheric pressure, pressure gauge and absolute pressure.	21	1	Pascal's law for pressure, force & velocity. Effect of viscosity with respect to Temperature, Working principles of pressure flow meters and basic units of pressure & converting units.	21
2	Number Systems: Introduction, Decimal, Binary, Octal, Hexadecimal, BCD code, ASCII code, Bit, Byte, KB, MB, GB, Conversion, Addition, Subtraction, Multiplication, Division, Boolean Algebra: Simplification of Boolean Algebra and equations.		2	<b>Electronics Basics:</b> Semiconductor, diode, working of diodes. Transistors:- PNP-NPN, triode and transistor	
3	<b>Electrical:</b> Calculation of resistance, reactance and capacitance		3	<b>Electrical Basics- Ohm's Law, Kirchhoff's law, electromagnetism</b>	
4	Simple problems on profit and loss.  Simple and compound interest.		4	<b>Sensor technology:</b> Principle of sensor, types and applications	
5	<b>System calculation:</b> Work done, power consumption, overall efficiency calculation		5	Mechanical & Electrical work, energy and power, efficiency	