

Syllabus for the subject

of

WORKSHOP CALCULATION & SCIENCE

(For 3rd & 4th semester)

Under

CRAFTSMEN TRAINING SCHEME (CTS)

For the trades of

1. Attendant Operator (Chemical Plant)
2. Maintenance Mechanic (Chemical Plant)
3. Instrument Mechanic (Chemical Plant)
4. Laboratory Attendant (Chemical Plant)

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

3rd semester
Workshop Calculation and Science
For the Trades of

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| 1. Attendant Operator (Chemical Plant) | 3. Instrument Mechanic (Chemical Plant) |
| 2. Maintenance Mechanic (Chemical Plant) | 4. Laboratory Attendant (Chemical Plant) |

Calculation			Science		
Sl. No.	Description	Hrs.	Sl. No.	Description	Hrs.
1	Density and specific gravity . Archimedes's principle, principle of floatation hydrometers. Centre of gravity and equilibrium condition.	21	1	Definition - viscosity, flash point, fire point, flash points of standard lubricating oils, octane number.	21
2	Pressure, temperature, Boyle's law, Charle's law, Equation of perfect gas. Calculations. Definition - Torque, compression ratio, IHP, BHP, Mechanical efficiency.		2	Newton's laws of motion, unit of force, find out resultant force, space and vector diagram, representation of force, parallel force, couple, parallelogram law of forces, condition of equilibrium, kind of equilibrium, some examples of equilibrium in daily life, Lami's theorem.	
3	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		3	Advantages & Disadvantages of friction, Limiting friction, Laws of limiting friction, Coefficient of friction, angle of friction, Inclined plane, Force of friction	
4	Moment and lever-Moments, unit, arm of couple. Principle of Moment, moment of couple, lever, torque. Centre of Gravity, (C.G. Of square, rectangle, triangle, circle, semicircle, cone) & its calculations		4	Introduction, Different types of stresses, Hooke's law, Young's modulus or modulus of elasticity, yield point, factor of safety, stress strain graph, Modulus of rigidity, Poisson's ratio, Calculation (i.e. stress, strain, young modulus, factor of safety)	

4th semester Workshop Calculation and Science
Chemical Sector
For the Trades of

1. Attendant Operator (Chemical Plant)
3. Instrument Mechanic (Chemical Plant)

2. Maintenance Mechanic (Chemical Plant)
4. Laboratory Attendant (Chemical Plant)

Calculation			Science		
Sl. No.	Description	Hrs.	Sl. No.	Description	Hrs.
1	Flow of fluids- Equation of continuity, Bernoulli's theorem, flow measurement by orifice meter, venturi meter, Rota meter, U-tube manometer.	21	1	Transmission of Motion and Power- Belt and pulley system, calculation to find out length of belt, slip of belt, RPM, Dia. Of pulley, circular & dimetral pitch of gear, distance between centre of two gears	21
			2	DEFINITION: Torque, compression ratio, IHP, BHP, Mechanical efficiency, FHP, Swept volume, piston speed (for reciprocating machine) & Calculations	
			3	Bending moment (BM), shearing force, Beam -simply supported beam, simply supported beam with distributed load, cantilever with point load at the free end, cantilever with distributed load and its calculation.	
2	Further Mensuration:- Volumes of frustums including conical frustums. Graph- Basics, abscissa, co-ordinate etc. $Y = mx$ and $Y = mx + c$ graph		4	Latent heat, sensible heat, saturated steam, wet steam, superheated steam. Reynolds's number, calculation of Reynolds's number at different velocities,	
			3	Simple Problems on Profit & Loss. Simple and compound interest.	