Syllabus for the subject

of

WORKSHOP CALCULATION & SCIENCE

(For 3rd & 4th semester)

Under

CRAFTSMEN TRAINING SCHEME (CTS)

For the Trades of

1. Electronics Mechanic
2. Mechanic Consumer Electronics Appliances
3. Technician Power Electronics System
4. Electrician
5. Electroplater
6. Lift and Escalator Mechanic

Re-Designed

in

2015

By

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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

1. Electronics & Hardware sector
2. Power Generation, Transmission, Distribution, Wiring, and Electrical Equipment
3. IT & ITES

For the Trades of

1. Electronics Mechanic
2. Mechanic Consumer Electronics Appliances
3. Technician Power Electronics System
4. Electrician
5. Electroplater
6. Lift and Escalator Mechanic

Calculation			Science		
Sl. No.	Description	Hrs.	Sl. No.	Description	Hrs.
1	**Indices:** Laws of indices related problems. **Quadratic Equation:** Introduction, solution of simple Quadratic equation and related problems.	22	1	**Elasticity:** Stress, strain, Modulus of elasticity, elastic limit, Hooks law, young's modulus.	22
2	Solution of simple A.C. circuit with R.L.C. Calculation of power factor etc.		2	**Material:** Introduction, types and properties. Uses of Conducting, Semi-conducting and insulating materials.	
3	**A.C Waveform Calculation:** Calculation of r.m.s, average, instantaneous value, peak value. Peak to peak value, Frequency and wavelength calculation and their relationship		3	**Magnetism:** Magnetic material, magnetic field, flux density, magnetic moment, m.m.f. Reluctance, permeability, susceptibility, electromagnet, solenoid and its practical applications.	
4	**Series And Parallel Connection of Electrical and Electronic components:** 1. Calculation Series and parallel connection of Resistors. 2. Calculation Series and parallel connection of Capacitors. 3. Calculation Series and parallel connection of Inductors. 4. Calculation Series and parallel connection of Batteries. Conversion of power flow to H.P. Calculation of KVA.		4	**Pressure:-** Pneumatic pressure, PSI, bar, atmospheric pressure, pressure gauge and absolute pressure, Heat treatment process.	

4th semester Workshop Calculation and Science
Electronics & Hardware sector

1. Electronics Mechanic
2. Mechanic Consumer Electronics Appliances
3. Technician Power Electronics System

Calculation			Science		
Sl. No.	Description	Hrs.	Sl. No.	Description	Hrs.
1	**Power supply:** Calculation of SMPS, regulation, Calculation of load and wattage for selection of UPS, calculate of back up time of Battery related to UPS and Load, calculate of voltage regulation , firing angle calculation of ripple factor, voltage regulation of DC voltage. Calculate the regulation of solar power.	22	1	Power transmission by shaft, belts and ropes.	22
2	**Motor parameters & Calculation:** Speed and frequency calculation of A.C motors, D.C motors.		2	**Friction:** Law of friction, co-efficient of friction, angle of friction, advantage and disadvantage of friction.	
3	**Modulation:** AM/FM modulation index calculation, calculation of Bandwidth, Percentage of modulation in FM/AM.		3	**Force:** Resolution and Composition of forces. Representation of forces by vectors, simple problems on lifting tackles like Jib wall, crane solution of problems with the aid of vectors, General condition of equilibrium for series of forces on a body.	
4	**Number Systems:** Introduction, Decimal, Binary, Octal, Hexadecimal, BCD code, ASCII code, Bit, Byte, KB, MB, GB, Conversion, Addition, Subtraction, Multiplication, Division, 1st and 2s complement method, 9s and 10s complement method. **Boolean Algebra:** Simplification of Boolean Algebra and equations.		4	**Gravity:** Centre of Gravity, simple experiments stable, unstable and neutral equilibrium.	
5	**Project costing:** Project selection, cost of project, Simple estimation, simple problems on profit and loss , Balance sheet etc.				

4th semester Workshop Calculation and Science

Sector: Power Generation, Transmission, Distribution, Wiring, and Electrical Equipments

For the trades of

1. Electrician
2. Electroplater
3. Lift and Escalator Mechanic

Sl. No.	Description	Hrs.	Sl No.	Description	Hrs.
1	**Number system:-** decimal and binary, Octal Hexa decimal. BCD code, conversion from decimal to binary and vice-versa, all other conversions. Practice on conversions.		1	**Friction: -** Laws of friction, co- efficient of friction, angle of friction, simple problems related to friction. Lubrication Concept on terms like pressure, atoms-pheric pressure, gauge pressure. Heat treatment necessity difference methods.	
2	**Estimation & costing:-** Simple estimation of the requirement of materials etc. as applicable to the trade. Problems on estimation and costing. **Further Mensuration:-** Volumes of frustums including conical frustums. **Graph-** Basics, abscissa, co-ordinate etc. Y = mx and Y= mx + c graph		2	**Forces: -** Resolution and composition of forces. Representation of force by vectors, simple problems on lifting tackles like jib wall, crane-Solution of problems with the aid of vectors. General condition of equilibriums for series of forces on a body. Law of parallelogram, Triangle Law, Lami's theorem.	
3	Simple Problems on Profit & Loss. Simple and compound interest.		3	**Centre of gravity:-** Centre of gravity concept and C.G. of different lamina. Equilibrium different kinds stable, unstable and neutral. Law of parallelogram force. Triangle law, Lami's theorem stable, unstable and neutral equilibrium.	