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**

**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**

|  |  |  |  |
| --- | --- | --- | --- |
| 1. | Electronics Mechanic | **4.** | **Electrician** |
| 2. | Mechanic Consumer Electronics | 5. | Electroplater |
|  | Appliances | 6. | Lift and Escalator Mechanic |

1. Technician Power Electronics System

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

1. Calculation Series and parallel connection of Resistors.
2. Calculation Series and parallel connection of
3. Capacitors.
   1. Calculation Series and parallel connection of Inductors.
   2. Calculation Series and parallel connection of Batteries.

Conversion of power flow to

H.P.

Calculation of KVA.

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