Revised syllabus of

Workshop Calculation & Science (WCS)

for 81 Engineering Trades

Please note that this syllabus is effective from 2021-22 session.

This syllabus is merged with Trade theory syllabus and will be assessed as a part of Trade Theory CBT.

List of Revised Syllabus of Workshop Calculation & Science (Engineering Trades)

Sl. No.	Name of Trade (NSQF Level)	Duration in Year	Revised Hours 1st Year (Earlier 80 hrs.)	Revised Hours 2nd Year (Earlier 80 hrs.)
1.	Additive Manufacturing Technician (3D Printing) (NSQF Level - 4)	1	38	-
2.	Advanced CNC Machining Tech.(NSQF Level - 5)	2	38	34
3.	Aeronautical Structure and Equipment Fitter (NSQF Level - 5)	2	40	22
4.	Architectural Draughtsman (NSQF Level - 5)	2	40	36
5.	Attendant Operator (Chemical Plant) (NSQF Level - 5)	2	38	18
6.	Basic Designer and Virtual Verifier (Mechanical) (NSQF Level - 5)	2	22	24
7.	Carpenter (NSQF Level - 4)	1	26	-
8.	Central Air Condition Plant Mechanic (NSQF Level - 5)	2	40	34
9.	Civil Engineering Assistant (NSQF Level - 5)	2	40	38
10.	Draughtsman (Civil) (NSQF Level - 5)	2	40	40
11.	Draughtsman Mechanical (NSQF Level - 5)	2	34	24
12.	Domestic Painter (NSQF Level - 4)	1	18	-
13.	Electrician (NSQF Level - 5)	2	30	32
14.	Electrician-Power Distribution (NSQF Level - 5)	2	40	34
15.	Electronics Mechanic (NSQF Level - 5)	2	35	16
16.	Electroplater (NSQF Level - 5)	2	40	22
17.	Fitter (NSQF Level - 5)	2	38	28
18.	Foundryman (NSQF Level - 4)	1	36	-
19.	Information and Communication Technology System Maintenance (NSQF Level - 5)	2	30	24
20.	Instrument Mechanic (Chemical Plant) (NSQF Level - 5)	2	38	18

Sl. No.	Name of Trade (NSQF Level)	Duration in Year	Revised Hours 1st Year (Earlier 80 hrs.)	Revised Hours 2nd Year (Earlier 80 hrs.)
21.	Industrial Painter (NSQF Level - 4)	1	30	-
22.	Industrial Robotics & Digital Manufacturing Tech. (NSQF Level - 4)	1	40	-
23.	Information Technology (NSQF Level - 5)	2	24	24
24.	Instrument Mechanic (NSQF Level - 5)	2	38	18
25.	In-Plant Logistics Assistant (NSQF Level - 4)	1	34	-
26.	Interior Design and Decoration (NSQF Level - 4)	1	32	-
27.	Laboratory Assistant (Chemical Plant) (NSQF Level - 5)	2	28	18
28.	Lift and Escalator Mechanic (NSQF Level - 5)	2	38	32
29.	Mechanic Agricultural Machinery (NSQF Level - 5)	2	36	16
30.	Machinist Grinder (NSQF Level - 5)	2	36	38
31.	Machinist (NSQF Level - 5)	2	36	38
32.	Maintenance Mechanic (Chemical Plant) (NSQF Level - 5)	2	30	12
33.	Manufacturing Process Control and Automation (NSQF Level - 4)	1	36	-
34.	Marine Engine Fitter (NSQF Level - 4)	1	30	-
35.	Marine Fitter (NSQF Level - 5)	2	38	22
36.	Mason (Building Constructor) (NSQF Level - 3)	1	36	-
37.	Mechanic Auto Body Paint Repair (NSQF Level - 4)	1	40	-
38.	Mechanic Auto Body Repair (NSQF Level - 4)	1	40	-
39.	Mechanic Auto Electrical and Electronics (NSQF Level - 4)	1	40	-
40.	Mechanic Consumer Electronic Appliances (NSQF Level - 5)	2	35	16
41.	Mechanic Electric Vehicle (NSQF Level - 4)	2	40	26

Sl. No.	Name of Trade (NSQF Level)	Duration in Year	Revised Hours 1st Year (Earlier 80 hrs.)	Revised Hours 2nd Year (Earlier 80 hrs.)
42.	Mechanic Diesel (NSQF Level - 4)	1	40	-
43.	Mechanic Lens/ Prism Grinding (NSQF Level - 4)	1	32	-
44.	Mechanic Motor Vehicle (NSQF Level - 5)	2	40	34
45.	Mechanic Machine Tool Maintenance (NSQF Level - 5)	2	36	36
46.	Mechanic Mining Machinery (NSQF Level - 5)	2	34	30
47.	Mechanic Tractor (NSQF Level - 4)	1	40	-
48.	Mechanic Two and Three-Wheeler (NSQF Level - 4)	1	28	-
49.	Operator Advanced Machine Tool (NSQF Level - 5)	2	36	36
50.	Painter (General) (NSQF Level - 5)	2	18	30
51.	Plastic Processing Operator (NSQF Level - 4)	1	30	-
52.	Plumber (NSQF Level - 4)	1	32	-
53.	Pump Operator cum Mechanic (NSQF Level - 4)	1	38	-
54.	Refractory Technician (NSQF Level - 5)	2	38	28
55.	Refrigeration and Air Conditioning Technician (NSQF Level - 5)	2	38	40
56.	Rubber Technician (NSQF Level - 4)	1	38	-
57.	Sheet Metal Worker (NSQF Level - 3)	1	38	-
58.	Solar Technician (Electrical) (NSQF Level - 4)	1	36	-
59.	Spinning Technician (NSQF Level - 5)	2	20	26
60.	Stone Processing Machine Operator (NSQF Level - 4)	1	34	-
61.	Stone Mining Machine Operator (NSQF Level - 4)	1	32	-
62.	Surveyor (NSQF Level - 5)	2	40	40

Sl. No.	Name of Trade (NSQF Level)	Duration in Year	Revised Hours 1st Year (Earlier 80 hrs.)	Revised Hours 2nd Year (Earlier 80 hrs.)
63.	Tool & Die Maker (Dies & Moulds) (NSQF Level - 5)	2	40	34
64.	Tool & Die Maker (Press Tools, Jigs & Fixtures) (NSQF Level - 5)	2	40	34
65.	Tech. Electronics System Design & Repair (NSQF Level-5)	2	28	16
66.	Technician Medical Electronics (NSQF Level - 5)	2	36	20
67.	Technician Mechatronics (NSQF Level - 5)	2	36	16
68.	Technician Power Electronics Systems (NSQF Level - 5)	2	34	16
69.	Textile Mechatronics (NSQF Level - 5)	2	36	16
70.	Textile Wet Processing Technician (NSQF Level - 5)	2	30	18
71.	Turner (NSQF Level - 5)	2	40	34
72.	Vessel Navigator (NSQF Level - 5)	2	30	18
73.	Warehouse Technician (NSQF Level - 4)	1	40	-
74.	Welder (NSQF Level - 4)	1	38	-
75.	Welder (GMAW & GTAW) (NSQF Level - 3)	1	38	-
76.	Welder (Pipe) (NSQF Level - 3)	1	38	-
77.	Welder (Structural) (NSQF Level - 3)	1	38	-
78.	Welder (Fabrication & Fitting) (NSQF Level - 3)	1	38	-
79.	Welder (Welding & Inspection) (NSQF Level - 3)	1	38	-
80.	Weaving Technician (NSQF Level - 5)	2	24	28
81.	Wireman (NSQF Level - 4)	2	30	28

REVISED SYLLABUS FOR WORKSHOP CALCULATION & SCIENCE - ENGINEERING TRADES

NAME OF TRADE : ELECTRICIAN (1st Year)

Sr. No.	Title of the Exercise	NIMI Books' Page No.	NIMI Books' Exercise No.	To be Retained / Not retained	Revised Hours	Remarks/ Justification
I	**Unit, Fractions**				**4**	
1	Classification of unit system	1	1.1.01	Retained		
2	Fundamental and Derived units F.P.S, C.G.S, M.K.S and SI units	2--3	1.1.02	Retained		
3	Measurement units and conversion	4--13	1.1.03	Retained		
4	Factors, HCF, LCM and problems	14	1.1.04	Retained		
5	Fractions - Addition, subtraction, multiplication & division	15--16	1.1.05	Retained		
6	Decimal fractions - Addition, subtraction, multiplication & division	17-19	1.1.06	Retained		
7	Solving problems by using calculator	20-26	1.1.07	Retained		
II	**Square root, Ratio and Proportions, Percentage**				**6**	
1	Square and square root	27	1.2.08	Retained		
2	Simple problems using calculator	28	1.2.09	Retained		
3	Applications of Pythagoras theorem and related problems	29	1.2.10	Retained		
4	Ratio and proportion	30-31	1.2.11	Retained		
5	Ratio and proportion - Direct and indirect proportions	32-35	1.2.12	Retained		

6	Percentage	36-38	1.2.13	Retained		
7	Percentage - Changing percentage to decimal and fraction	39	1.2.14	Retained		
III	**Material Science**				**2**	
1	Types metals, types of ferrous and non ferrous metals	40 -41	1.3.15	Retained		
2	~~Physical and mechanical properties of metals~~	42-44	1.3.16	Deleted		Covered in theory syllabus
3	Introduction of iron and cast iron	45-47	1.3.17	Retained		
4	~~Difference between iron & steel, alloy steel and carbon steel~~	48-49	1.3.18	Deleted		Covered in theory syllabus
5	~~Properties and uses of rubber, timber and insulating materials~~	50-52	1.3.19	Deleted		Covered in theory syllabus
IV	**Mass, Weight, Volume and Density**				**3**	
1	Mass, volume, density, weight ~~and specific gravity~~	53-54	1.4.20	Partially deleted		
2	Related problems for mass, volume, density, weight and specific gravity	55-60	1.4.21	Retained		
V	**Speed and Velocity, Work, Power and Energy**				**0**	
1	~~Speed and velocity - Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation~~	61-64	1.5.22	Deleted		
2	~~Speed and velocity - Related problems on speed & velocity~~	65-68	1.5.23	Deleted		
3	Work, power, energy, HP, IHP, BHP and efficiency	69-71	1.5.24	Retained		
4	Potential energy, kinetic energy and related problems with assignment	72-73	1.5.25	Retained		
VI	**Heat & Temperature and Pressure**				**5**	

1	Concept of heat and temperature, effects of heat, difference between heat and temperature, boiling point & melting point of different metals and non-metals	74-75	1.6.26	Retained		
2	Scales of temperature, Celsius, Fahrenheit, kelvin and conversion between scales of temperature	76-77	1.6.27	Retained		
3	Heat &Temperature - Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat - Conduction, convection and radiation	78-79	1.6.28	Retained		
4	~~Co-efficient of linear expansion and related problems with assignments~~	80-81	1.6.29	Deleted		
5	~~Problem of heat loss and heat gain with assignments~~	82-85	1.6.30	Deleted		
6	~~Thermal conductivity and insulators~~	86-87	1.6.31	Deleted		
7	~~Concept of pressure - Units of pressure, atmospheric pressure, absolute pressure, gauge pressure and gauges used for measuring pressure~~	88-97	1.6.32	Deleted		
VII	**Basic Electricity**				**0**	
1	Introduction and uses of electricity, molecule, atom, how electricity is produced, electric current AC,DC their comparison, voltage, resistance and their units	98	1.7.33	Deleted		Already covered in theory
2	Conductor, insulator, types of connections - series and parallel	102-107	1.7.34	Deleted		Already covered in theory
3	Ohm's law, relation between V.I.R & related problems	108	1.7.35	Deleted		Already covered in theory
4	Electrical power, energy and their units, calculation with assignments	112-114	1.7.36	Deleted		Already covered in theory
5	Magnetic induction, self and mutual inductance and EMF generation	115-117	1.7.37	Deleted		Already covered in theory

46	Electrical power, HP, energy and units of electrical energy	118-120	1.7.38	Deleted		Already covered in theory
VIII	**Mensuration**				**7**	
1	Area and perimeter of square, rectangle and parallelogram	121-124	1.8.39	Retained		
2	Area and perimeter of Triangles	125-129	1.8.40	Retained		
3	Area and perimeter of circle, semi-circle, circular ring, sector of circle, hexagon and ellipse	130-137	1.8.41	Retained		
4	Surface area and volume of solids - cube, cuboid, cylinder, sphere and hollow cylinder	138-144	1.8.42	Retained		
5	~~Finding the lateral surface area, total surface area and capacity in litres of hexagonal, conical and cylindrical shaped vessels~~	145-147	1.8.43	Deleted		
IX	**Levers and Simple machines**					
1	~~Simple machines - Effort and load, mechanical advantage, velocity ratio, efficiency of machine, relationship between efficiency, velocity ratio and mechanical advantage~~	148-149	1.9.44	Deleted		
2	Lever & Simple machines - Lever and its types	150-153	1.9.45	Retained	**3**	
X	**Trigonometry**					
1	Measurement of angles	154-155	1.10.46	Retained		
2	Trigonometrical ratios	156-161	1.10.47	Retained		

3	Trigonometrical tables	162-172	1.10.48	Retained		
4	Application in calculating height and distance (Simple applications)	173-177	1.10.49	Deleted		
			TOTAL REVISED HOURS		**30**	

REVISED SYLLABUS FOR WORKSHOP CALCULATION & SCIENCE - ENGINEERING TRADES

NAME OF TRADE : ELECTRICIAN (2nd Year)

Sr. No.	Title of the Exercise	NIMI Books' Page No.	NIMI Books' Exercise No.	To be Retained / Not retained	Revised Hours	Remarks/ Justification
I	**Friction**				**2**	
1	~~Friction - Advantages and disadvantages, Laws of friction, co-efficient of friction, angle of friction, simple problems related to friction~~	1--7	2.1.01	Deleted		
2	Friction - Lubrication	8--11	2.1.02	Retained		
3	~~Friction - Co- efficient of friction, application and effects of friction in workshop practice~~	12--13	2.1.03	Deleted		
II	**Centre of Gravity**				**6**	
1	~~Centre of gravity - Centre of gravity and its practical application~~	14--23	2.2.04	Deleted		
III	**Area of cut out regular surfaces and area of irregular surfaces**				**0**	
1	~~Area of cut out regular surfaces - circle, segment and sector of circle~~	24--26	2.3.05	Deleted		
2	~~Related problems of area of cut out regular surfaces - circle, segment and sector of circle~~	27--28	2.3.06	Deleted		
3	~~Area of irregular surfaces and application related to shop problems~~	29--31	2.3.07	Deleted		
IV	**Algebra**				**10**	
1	Algebra - Addition , subtraction, multiplication & division	32--35	2.4.08	Retained		

2	Algebra - Theory of indices, algebraic formula, related problems	36--40	2.4.09	Retained		
V	**Elasticity**				**2**	
1	Elasticity - Elastic, plastic materials, stress, strain and their units and young's modulus	41-52	2.5.10	Retained		
2	~~Elasticity - Ultimate stress and working stress~~	53-55	2.5.11	Deleted		
VI	**Heat Treatment**				**0**	
1	~~Heat treatment and advantages~~	56-57	2.6.12	Deleted		
2	~~Heat treatment - Different heat treatment process – Hardening, tempering, annealing, normalising and case hardening~~	58--66	2.6.13	Deleted		
VII	**Profit and Loss**				**4**	
1	Profit and loss - Simple problems on profit & loss	67--72	2.7.14	Retained		
2	Profit and loss - Simple and compound interest	73--84	2.7.15	Retained		
VIII	**Estimation and Costing**				**8**	
1	Estimation and costing - Simple estimation of the requirement of material etc., as applicable to the trade	85-91	2.8.16	Retained		
2	Estimation and costing - Problems on estimation and costing	92	2.8.17	Retained		
			TOTAL REVISED HOURS		**32**	