

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 &amp; 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

<b>REVISED SYLLABUS FOR WORKSHOP CALCULATION &amp; SCIENCE - ENGINEERING TRADES</b>						
<b>NAME OF TRADE : FITTER (1st Year)</b>						
<b>Sr. No.</b>	<b>Title of the Exercise</b>	<b>NIMI Books' Page No.</b>	<b>NIMI Books' Exercise No.</b>	<b>To be Retained / Deleted</b>	<b>Revised Hours</b>	<b>Remarks/ Justification</b>
<b>I</b>	<b>Unit, Fractions</b>				<b>4</b>	
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		
<b>II</b>	<b>Square root, Ratio and Proportions, Percentage</b>				<b>6</b>	
1	Square and square root	27	1.2.08	Retained		
2	Simple problems using calculator	28	1.2.09	Retained		Only direct solving problems
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		
<b>III</b>	<b>Material Science</b>				<b>0</b>	
1	<del>Types metals, types of ferrous and non ferrous metals</del>	40 -41	1.3.15	Deleted		Covered in theory
2	<del>Physical and mechanical properties of metals</del>	42-44	1.3.16	Deleted		Covered in theory
3	<del>Introduction of iron and cast iron</del>	45-47	1.3.17	Deleted		Covered in theory
4	<del>Difference between iron &amp; steel, alloy steel and carbon steel</del>	48-49	1.3.18	Deleted		Covered in theory
5	<del>Properties and uses of rubber, timber and insulating materials</del>	50-52	1.3.19	Deleted		Covered in theory
<b>IV</b>	<b>Mass, Weight, Volume and Density</b>				<b>4</b>	
1	Mass, volume, density, weight and specific gravity	53-54	1.4.20	Retained		
2	Related problems for mass, volume, density, weight and specific gravity	55-60	1.4.21	Retained		
<b>V</b>	<b>Speed and Velocity, Work, Power and Energy</b>				<b>2</b>	
1	<del>Speed and velocity - Rest, motion, speed, velocity, difference between speed and velocity, acceleration and retardation</del>	61-64	1.5.22	Deleted		
2	<del>Speed and velocity - Related problems on speed &amp; velocity</del>	65-68	1.5.23	Deleted		
3	Work, power, energy, HP, IHP, BHP and efficiency	69-71	1.5.24	Retained		
4	<del>Potential energy, kinetic energy and related problems with assignment</del>	72-73	1.5.25	Deleted		
<b>VI</b>	<b>Heat &amp; Temperature and Pressure</b>				<b>4</b>	
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	Deleted		
3	Temperature measuring instruments, types of thermometer, pyrometer and transmission of heat – Conduction, convection and radiation	78-79	1.6.28	Deleted		
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	Retained		
<b>VII</b>	<b>Basic Electricity</b>				<b>2</b>	
1	Introduction and uses of electricity, <del>molecule, atom, how electricity is produced</del> , electric current AC,DC their comparison, voltage, resistance and their units	98	1.7.33	Partially retained		
2	Conductor, insulator, types of connections – series and parallel	102-107	1.7.34	Deleted		
3	Ohm's law, relation between V.I.R & related problems	108	1.7.35	Deleted		
4	Electrical power, energy and their units, calculation with assignments	112-114	1.7.36	Deleted		
5	Magnetic induction, self and mutual inductance and EMF generation	115-117	1.7.37	Deleted		
46	Electrical power, HP, energy and units of electrical energy	118-120	1.7.38	Deleted		
<b>VIII</b>	<b>Mensuration</b>				<b>8</b>	
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	Retained		
<b>IX</b>	<b>Levers and Simple machines</b>				<b>2</b>	
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	Retained		
2	<del>Lever &amp; Simple machines – Lever and its types</del>	150-153	1.9.45	Deleted		
<b>X</b>	<b>Trigonometry</b>				<b>6</b>	
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	<del>Application in calculating height and distance (Simple applications)</del>	173-177	1.10.49	Deleted		
			<b>TOTAL REVISED HOURS</b>		<b>38</b>	

**REVISED SYLLABUS FOR WORKSHOP CALCULATION & SCIENCE - ENGINEERING TRADES****NAME OF TRADE : FITTER (2nd Year)**

<b>Sr. No.</b>	<b>Title of the Exercise</b>	<b>NIMI Books' Page No.</b>	<b>NIMI Books' Exercise No.</b>	<b>To be Retained / Deleted</b>	<b>Revised Hours</b>	<b>Remarks/ Justification</b>
<b>I</b>	<b>Friction</b>				<b>6</b>	
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	Retained		Not to be taught in detail
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	Retained		
<b>II</b>	<b>Centre of Gravity</b>				<b>4</b>	
1	Centre of gravity - Centre of gravity and its practical application	14--23	2.2.04	Retained		
<b>III</b>	<b>Area of cut out regular surfaces and area of irregular surfaces</b>				<b>8</b>	
1	Area of cut out regular surfaces - circle, segment and sector of circle	24--26	2.3.05	Retained		
2	Related problems of area of cut out regular surfaces - circle, segment and sector of circle	27--28	2.3.06	Retained		
3	Area of irregular surfaces and application related to shop problems	29--31	2.3.07	Retained		
<b>IV</b>	<b>Algebra</b>				<b>0</b>	

1	<del>Algebra – Addition, subtraction, multiplication &amp; division</del>	32--35	2.4.08	Deleted		Already covered in 1 st year
2	<del>Algebra – Theory of indices, algebraic formula, related problems</del>	36--40	2.4.09	Deleted		
<b>V</b>	<b>Elasticity</b>				<b>2</b>	
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	Retained		
<b>VI</b>	<b>Heat Treatment</b>				<b>2</b>	
1	Heat treatment and advantages	56-57	2.6.12	Retained		Only intro as covered in theory
2	Heat treatment - Different heat treatment process – Hardening, tempering, annealing, normalising and case hardening	58--66	2.6.13	Retained		Only intro as covered in theory
<b>VII</b>	<b>Profit and Loss</b>				<b>0</b>	
1	<del>Profit and loss – Simple problems on profit &amp; loss</del>	67--72	2.7.14	Deleted		
2	<del>Profit and loss – Simple and compound interest</del>	73--84	2.7.15	Deleted		
<b>VIII</b>	<b>Estimation and Costing</b>				<b>6</b>	
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		
			<b>TOTAL REVISED HOURS</b>		<b>28</b>	