

# MECHANICAL FACULTY

## COURSES & SYLLABII



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## MECHANICAL COURSES

### CERTIFICATE COURSES

1	Turner [ T ]	One paper of 3 Hrs. 100 Marks	One Pract. of 2 Hrs. 75 Pract. + 15 Journal + 10 Oral = Total 100 Marks Sessional Internal Marks - 50
2	Fitter [ F ]	One paper of 3 Hrs. 100 Marks	- DO -
3	Machinist [ M ]	One paper of 3 Hrs. 100 Marks	- DO -
4	Welder Practice [ WP ]	One paper of 3 Hrs. 100 Marks	One Pract. of 2 Hrs. 75 Pract. + 15 Journal + 10 Oral = Total 100 Marks
5	Mechanical Draughtsman [ MD ]	Paper I & II (Dwg.) of 3 Hrs. 100 Marks each	No Practical
6	Piping Drafting & Designing [ PDD ]	Paper I & II (Dwg.) of 3 Hrs. 100 Marks each	No Practical
7	CNC Programming [ CNC ]	Two paper of 3 Hrs. 100 Marks each	No Practical

### DIPLOMA ENGINEERING SERVICES COURSES

8	Diploma Mechanical Engineering Services [ DMES ]	Four papers of 3 Hrs. 100 Marks each	One Pract. of 2 Hrs. 75 Pract. + 15 Journal + 10 Oral = 100 Marks Sessional Drawing marks ( Internal ) 50 Marks Sessional Job work ( Internal ) 50 Marks Total 200 Marks
9	Diploma Piping Drafting & Designing [ DPDD ]	Three papers of 3 Hrs. 100 Marks each	No Practical
10	Diploma CNC Programming	Four papers of 3 Hrs. 100 Marks each	No Practical

Minimum Passing for Theory - 35 Marks Each.  
Minimum Passing for Practical - 40 Marks Each.

**INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI**  
**CERTIFICATE COURSE**  
**TURNER ( T )**

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EXAM SCHEME: THEORY PAPER – I - 100 MARKS – 3 HRS.  
PRACTICAL 100 MARKS – 2 HRS.

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**THEORY SYLLABUS**

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**1. SAFETY:**

- General safety, Personal safety, Mechanical tool safety, Safety rules to be observed in Workshop. First-Aid knowledge & cause of accident & its prevention.
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**2. UNITS OF MEASUREMENTS:**

- British & Metric system of units, its conversions in respect of measurements for e.g. linear, Area & volume.
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**3. MEASURING INSTRUMENTS:**

- i) Classification of measuring Instruments.
  - ii) Precision Instruments: - Micrometer (Out side, inside, depth gauge) ,Vernier Calipers: Vernier Caliper, Height Gauge, steel rule, Try square slip gauge, sine bar.
  - iii) Non-precision Instruments: Steel rule.  
Caliper: Outside, Odd leg divider, Combination set, try square marking tools: Scriber & Scribing block, Surface plate, punches, hammers, Angle plate, Vee block, Marking Media (Persian Blue, Red Lead, Chalk).
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**4. CUTTING TOOLS:**

- i) Tap and Die Material for Tap & Die safety precautions while tapping.
  - i) Cutting tool Study of different cutting tools such as chisels, hacksaw blade.
  - ii) Files: Description, its material, grades, cuts & its parts uses. Specification. Care & Maintenance of files File cards, pinning of files, Special types of files such as needle files, Safe edge files, hand file etc.
  - ii) Cutting tools, its uses & selection of special tools such as drill, reamers, grinding wheels, knowledge of re sharpening of these tools.
  - iii) Drill: Knowledge of standard drill sizes such as letter No. & fractional drill nomenclature of drill & important angle of drill causes of breakage of drill. Importance of cutting speed and feed for drilling.
  - iv) Use of - Nomenclature of single point cutting tool
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**5. HOLDING DEVICE:**

- i) Work Holding Devices: Construction & use of devices such as bench vice, Machine vice, Clamps, Parallel block, step block, Nuts & Bolts etc.
  - ii) Cutting tools holding Device: Knowledge of holding devices such as sockets, Sleeves, Drill chucks, die stock & Top range.
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**6. GENERAL HAND TOOLS:**

Knowledge and importance of workshop, hand tools such as screw driver, Spanners, Single ended, ring spanner, pliers, mallet, soft hammer etc.

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**7. ENGINEERING FASTNER:**

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- Types of standard threads, such as metric BSW, BSP, BA, square, knuckle, ACME Threads and their applications.
- Types of screw such as counter sunk, Hexagonal, square half round headed screw, Allen key.
- Importance of fasteners in workshop practice, Introduction & types of various fasteners.
- Temporary fasteners: Various types of keys, pins, and cotters nuts and bolts. Studs, Washers etc.

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**8. LUBRICATION & LUBRICATIONS:**

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- i) Importance of coolants & Lubrication in workshop.
- ii) Properties of Lubricants, coolants for various metals.
- iii) Types of coolants, Lubricants used for machines.
- iv) Preventive Maintenance necessity. Advantages & Types of maintenance.

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**9. LIMITS, FITS, TOLERANCE & INTERCHANGEABILITY:**

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Standard systems of limits, fits & tolerance as per Indian standard, concept of Interchangeability.

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**10. JIGS & FIXTURES:**

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Construction & necessity of jigs & fixture, principles of jigs & fixture, Material used for Jigs & fixtures.

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**11. LATHE MACHINE:**

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- i) Familiarization with lathe machine.
- ii) Function of Lathe Machine and safety precaution to be observed while working on Lathe Machine.

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**12. LATHE MACHINES SPECIFICATIONS:**

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- i) Lathe machine main parts such as head stock, Tail stock, Carriage feed screw and lead screw.
- ii) Lathe machine driving mechanism – Gear driving and belt driving. Use of back gear.

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**13. TYPES OF LATHE MACHINES:**

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Understand different types of lathe machines such as center Lathe, Bench Lathe, Capstan Lathe and turret Lathe, special lathe (Gap Bed Lathe).

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**14. LATHE MACHINE ACCESSORIES AND ATTACHMENTS:**

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Study of the Lathe accessories such as Centers, Carrier Catch plate, Chuck face plates, Collate, Driving plate, Mandrel and tool post etc.

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**15. LATHE OPERATIONS:**

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- i) Understand basic common lathe operations such as facing, plain turning, centering, step Turning, shoulder turning, grooving, chamfering, boring etc.
- ii) Special Lathe Operations: Taper Turning, Use of Taper, Methods of calculation and Formulae.

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**16. INTRODUCTION TO C.N.C.:**

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- i) Operations of C.N.C. machines.
  - ii) Fundamental components and its function.
  - iii) Types of C.N.C
  - iv) a) Point to point control b) Continuous path control.
  - v) Types of C.N.C system and its function.
    - a) Open loop b) Closed loop.
  - vi) Advantage & disadvantage of C. N. C
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**17. MAINTENANCE OF MACHINE**

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- a) Types of Maintenance b) Need for Maintenance
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**SCHEME OF EXAMINATION**

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Theory One paper	3 Hours	100 Marks
Practical paper	2 Hours	100 Marks
Sessional Marks		100 Marks

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**GUIDELINES FOR QUESTION PAPER SETTERS**

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- Q. no.1 Compulsory (Objective type). 20 marks
  - Q. no.2 to 8 Solve any five questions from Q. 2 to 8 (Subjective type). 16 marks each
- The paper setter should take care that (as far as possible) entire syllabus is equally covered.



**INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI**  
**CERTIFICATE COURSE**  
**FITTER ( F )**

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**EXAM SCHEME: THEORY PAPER – I - 100 MARKS – 3 HRS.**  
**PRACTICAL 100 MARKS – 2 HRS.**

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**[ FITTER / DMES – I ]**  
**THEORY SYLLABUS**

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**1. SAFETY:**

- General safety, Personal safety, Mechanical tool safety, Safety rules to be observed in Workshop. First-Aid knowledge & cause of accident & its prevention.
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**2. UNITS OF MEASUREMENTS:**

- British & Metric system of units, its conversions in respect of measurements for e.g. linear, Area & volume.
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**3. MEASURING INSTRUMENTS:**

- i) Classification of measuring Instruments.
  - ii) Precision Instruments: - Micrometer (Out side, inside, depth gauge) Calipers: Vernier Caliper, Height Gauge, steel rule, Try square slip gauge, sine bar.
  - iii) Non-precision Instruments: Steel rule. Caliper: Outside, Odd leg divider, Combination set, try square marking tools: Scriber & Scribing block, Surface plate, punches, hammers, Angle plate, Vee block, Marking Media (Persian Blue, Red Lead, Chalk).
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**4. CUTTING TOOLS:**

- i) Study of different cutting tools such as chisels, hacksaw blade.
  - ii) Files: Description, its material, grades, cuts & its parts uses. Specification. Care & Maintenance of files File cards, pinning of files, Special types of files such as needle files, safe edge files, hand file etc.
  - iii) Cutting tools, its uses & selection of special tools such as drill, reamers, grinding wheels, knowledge of re sharpening of these tools.
  - iv) Drill: Knowledge of standard drill sizes such as letter No. & fractional drill nomenclature of drill & important angle of drill, causes of breakage of drill. Importance of cutting speed and feed for drilling.
  - v) Use of Tap and Die Material for Tap & Die safety precautions while tapping.
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**5. HOLDING DEVICE:**

- i) Work Holding Devices: Construction & use of devices such as bench vice, Machine vice, clamps, Parallel block, step block, Nuts & Bolts etc .
  - ii) Cutting tools holding Device: Knowledge of holding devices such as sockets, Sleeves, drill chucks, die stock & Top range.
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**6. GENERAL HAND TOOLS:**

Knowledge and importance of workshop, hand tools such as screw driver, Spanners, Single ended, ring spanner, pliers, mallet, soft hammer etc.

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**7. ENGINEERING FASTNER:**

- Types of standard threads, such as metric BSW, BSP, BA, square, knuckle, ACME Threads and their applications.
- Types of screw such as counter sunk, Hexagonal, Square half round headed screw, Allen key.

- Importance of fasteners in workshop practice, permanent fastener such as rivets, welding, Soldering, brazing, types and method of riveting.
- Temporary fastener: Various types of keys, pins, cotters nuts and bolts. Studs, Washers etc.

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**8. LUBRICATION & LUBRICATIONS:**

---

- i) Importance of coolants & Lubrication in workshop.
- ii) Properties of Lubricants, coolants for various metals.
- iii) Types of coolants, Lubricants used for machines.
- iv) Preventive Maintenance necessity. Advantages & Types of maintenance.

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**9. LIMITS, FITS, TOLERANCE & INTERCHANGEABILITY:**

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Standard systems of limits, fits & tolerance as per Indian standard, concept of interchangeability.

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**10. JIGS & FIXTURES:**

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Construction & necessity of jigs & fixture, principles of jigs & fixture, Material used for Jigs & fixtures.

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**11. GAUGES:**

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Knowledge of standard gauges. Classification of gauges such as working gauges, Inspection gauges and Master gauges. Types of Gauges such as snap gauges. Thickness gauges, wire gauge, plug gauges etc.

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**12. BEARINGS:**

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Introduction & classification of bearings. (general & thrust) Types of bearings such as Roller, Taper roller bearings ball bearings, needle roller bearing, Importance of bearing in Machine tools.

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**13. METALS AND NON - METALS**

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Uses & properties of metals, Difference between Ferrous & Non Ferrous metals.

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**14. MECHANICAL WORKING OF METALS**

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Hot working, Cold working, Smithing and Forging, Casting, Pattern making and Foundry

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**15. POWDER METALLURGY**

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Advantages & Disadvantages, Limitations, Process and Products of Powder Metallurgy

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**16. PLASTICS AND THEIR PROCESSING**

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Types of Plastics, Properties, Uses, Fabrication and Machining of Plastics

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**SCHEME OF EXAMINATION**

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Theory One paper	3 Hours	100 Marks
Practical paper	2 Hours	100 Marks
Sessional Marks		100 Marks

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**GUIDELINES FOR QUESTION PAPER SETTERS**

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- Q. no.1 Compulsory (Objective type). 20 marks
  - Q. no.2 to 8 Solve any five questions from Q. 2 to 8 (Subjective type). 16 marks each
- The paper setter should take care that (as far as possible) entire syllabus is equally covered.



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## CERTIFICATE COURSE MACHINIST ( M )

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**EXAM SCHEME: THEORY PAPER – I - 100 MARKS – 3 HRS.**  
**PRACTICAL 100 MARKS – 2 HRS.**

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### THEORY SYLLABUS

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#### 1. SAFETY:

- General safety, Personal safety, Mechanical tool safety, Safety rules to be observed in Workshop. First-Aid knowledge & cause of accident & its prevention.

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#### 2. UNITS OF MEASUREMENTS:

- British & Metric system of units, its conversions in respect of measurements for e.g. linear, Area & volume.

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#### 3. MEASURING INSTRUMENTS:

- i) Classification of measuring Instruments.
- ii) Precision Instruments: - Micrometer (Out side, inside, depth gauge) Calipers: Vernier Caliper, Height Gauge, steel rule, Try square slip gauge, sine bar.
- iii) Non-precision Instruments: Steel rule.  
Caliper: Outside, Odd leg divider, Combination set, try square Marking tools: Scriber & Scribing block, Surface plate, punches, hammers, Angle plate, Vee block, Marking Media (Persian Blue, Red Lead, Chalk).

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#### 4. CUTTING TOOLS:

- i) Study of different cutting tools such as chisels, hacksaw blade.
- ii) Files: Description, its material, grades, cuts & its parts uses. Specification. Care & Maintenance of files File cards, pinning of files, Special types of files such as needle files, safe edge files, hand file etc.
- iii) Cutting tools, its uses & selection of special tools such as drill, reamers, grinding wheels, knowledge of re sharpening of these tools.
- iv) Drill: Knowledge of standard drill sizes such as letter No. & fractional drill nomenclature of drill & important angle of drill causes of breakage of drill. Importance of cutting speed and feed for drilling.
- v) Use of Tap and Die Material for Tap & Die safety precautions while tapping.
- vi) Cutting tool - Nomenclature of single point cutting tool

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#### 5. HOLDING DEVICE:

- i) Work Holding Devices: Construction & use of devices such as bench vice, Machine vice, clamps, Parallel block, step block, Nuts & Bolts etc .
- ii) Cutting tools holding Device: Knowledge of holding devices such as sockets, Sleeves, drill chucks, die stock & Top range.

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#### 6. ENGINEERING FASTNER:

- Types of standard threads, such as metric BSW, BSP, BA, square, knuckle, ACME Threads and their applications.



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**7. LUBRICATION & LUBRICATIONS:**

---

- i) Importance of coolants & Lubrication in workshop.
  - ii) Properties of Lubricants, coolants for various metals.
  - iii) Types of coolants, Lubricants used for machines.
  - iv) Preventive Maintenance necessity. Advantages & Types of maintenance.
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**8. LIMITS, FITS, TOLERANCE & INTERCHANGEABILITY:**

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Standard systems of limits, fits & tolerance as per Indian standard, concept of interchangeability.

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**9. JIGS & FIXTURES:**

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Construction & necessity of jigs & fixture, principles of jigs & fixture, Material used for Jigs & fixtures.

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**10. GAUGES:**

---

Knowledge of standard gauges. Classification of gauges such as working gauges, Inspection gauges and Master gauges. Types of Gauges such as snap gauges. Thickness gauges, wire gauge, plug gauges etc.

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**SCHEME OF EXAMINATION**

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Theory One paper	3 Hours	100 Marks
Practical paper	2 Hours	100 Marks
Sessional Marks		100 Marks

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**GUIDELINES FOR QUESTION PAPER SETTERS**

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- Q. no.1 Compulsory (Objective type). 20 marks
  - Q. no.2 to 8 Solve any five questions from Q. 2 to 8 (Subjective type). 16 marks each
- The paper setter should take care that (as far as possible) entire syllabus is equally covered.



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## CERTIFICATE COURSE WELDER PRACTICE ( WP )

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<b>EXAM SCHEME:</b>	<b>THEORY PAPER</b>	<b>100 MARKS – 3 HRS.</b>
	<b>PRACTICAL</b>	<b>100 MARKS – 2 HRS.</b>

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### THEORY SYLLABUS

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#### 1. ARC WELDING

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1. Importance of safety, causes of accidents  
General safety precautions – work shop safety, self safety and Machine safety. Arc welding safety precautions to be taken while connection and operating of welding machine.
2. Tools and equipment's require for arc welding.  
Basic hand tools – Files, Hammer, Chisel try square calipers and their uses.  
Basic measuring tools – Scale & tapes measurements in metric & British units.
3. Arc welding terms and definitions.
4. Basic electricity A.C. & D.C.  
Electrical terms – current, voltage watt, resistance etc.
5. Different metal joining processes :-  
Mechanical – Riveting, Bolting, Hooking.  
Thermal – Soldering, Brazing, Forging, Welding.  
Types of joint and their edge preparation.  
Distortion, their causes and method to overcome it.  
Arc length – short etc. long arc, Advantages and disadvantages  
Arc welding it's principles – carbon and metallic arc.  
Different types of electrode and their flux coating.  
Welding positions – Down hand, horizontal, vertical and over head.  
Arc welding machine – Transformers, Generators, rectifier their construction, uses, advantages and disadvantages of each other.  
Welding symbol's for various joints.  
Welding of ferrous metals, mild steel, cast iron, stainless steel.  
Welding of non ferrous metal brass, copper, aluminum.
6. Defect in arc welding their causes & correction.  
Testing of weld – various non destructive tests and destructive tests.  
Resistance welding spot, butt, seam, Projection welding  
Advance welding techniques, Argon arc welding. Co<sub>2</sub> welding, submerged welding.
7. S.S. fabrication, super setive welding, pressure vessels, problems & welding inspection

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#### 2. GAS WELDING

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1. Safety precautions for gas welding.  
Safety precautions to be taken for cylinders, regulators while handling the gas welding plant.
2. Gas welding tools and equipment's and it's uses.
3. Common fuel gases used in welding i.e. Hydrogen, Coal gas, Propane and acetylene.
4. Types of various flames and their uses.
5. Types of joints and their preparations.
6. Gas welding torches, their types, uses and construction.

Introduction to high pressure and low pressure gas welding plants  
Advantages & disadvantages.  
Purifier and hydraulic Back pressure value.  
Welding techniques, left ward and right ward techniques.  
Different ferrous metals welding by gas i.e. mild steel, cast iron, stainless steel, Different non –ferrous metal welding by gas i.e. Brass, Copper, Aluminum.  
Brazing of mild steel copper cast iron.  
Soldering methods & their uses.

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**3. GAS CUTTING**

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Principle of oxy – Acetylene cutting.  
Cutting torch and it's construction.  
Oxy – Acetylene cutting procedure straight, angular and circle cutting.  
Machine cutting processes Trolley, cutting, Profile cutting, Powder cutting.

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**4 TYPES OF METALS, PROPERTIES & USES**

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**5 INSPECTION OF WELDING & WELDING JOINTS, WELDING SYMBOLS**

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**SCHEME OF EXAMINATION**

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Theory One paper	3 Hours	100 Marks
Practical paper	2 Hours	100 Marks

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**GUIDELINES FOR QUESTION PAPER SETTERS**

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Q. no.1 Compulsory (Objective type). 20 marks  
Q. no.2 to 8 Solve any five questions from Q. 2 to 8 (Subjective type). 16 marks each  
The paper setter should take care that (as far as possible) entire syllabus is equally covered.



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## CERTIFICATE COURSE MECHANICAL DRAUGHTSMAN ( MD ) PAPER - I

**EXAM SCHEME: THEORY PAPER – I ( MD – I ) - 100 MARKS – 3 HRS.  
DRAWING PAPER – II ( MD – II ) - 100 MARKS – 4HRS.**

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### THEORY SYLLABUS

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#### **PREAMBLE :**

A Candidate is expected to have technical aptitude, either he must be S.S.C. or have practical experience in drawing office. Candidate should be able to draw freehand sketches.

#### **OBJECTIVES :**

To understand the methods of projection, dimensioning etc. To be able to carry out elementary related calculations. To understand details and functions of std. engineering Components.

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#### **1. ENGINEERING DRAWING AND CONVENTIONS :**

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- Drawing instruments and their uses.  
(Aligned and Unidirectional) systems code of practice for general Engg. Drawing of IS 696.
- Symbols for line, conventional method of showing different metals and materials in section e.g. steel, lead, glass, rubber, zinc, wood, concrete etc.
- Conventional methods of showing different broken ends of shafts, round bars, pipes, wood etc.
- Symbols for various forms of welded joints as recommended by I.S.I., gears, springs common features.

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#### **2. ENGINEERING MATERIALS :**

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- 1 Understand metals and non metals, ferrous metals.
- 2 Properties and uses of common metals cast iron, wrought iron steel, alloy steel, non ferrous metal.

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#### **3. MATHEMATICS :**

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- 1 Units and measurements, conversion of units.
- 2 Menstruations – area, volume of regular solids such as cube, cones, prisms, pyramids, cylinder, sphere etc. To find the area of simple plane figures like triangle, square, parallelogram etc. trigonometric ratios-sine, cosine and tangent etc.

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#### **4. MEASURING INSTRUMENTS : Instrument reading**

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- 1 To understand the principle and construction of vernier & calliper, (inside and outside) micrometer (British and Metric), How to calculate the least count. Basic measuring instrument like steel rule, measuring tape etc.

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#### **5. LIMITS, FITS AND TOLERANCE : Inter changeability knowledge**

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Definition of limit, tolerance and allowance, types of tolerance, (unilateral and bilateral). Giving tolerance on the manufactured items, higher limit and lower limit, types of fits used in engineering.

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**6. SCREW THREADS AND THREADED FASTENERS :**

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- 1 Different types of triangular thread terms like B.S.W., B.A. Unified metric, B.S.F., B.S.P. also square thread terms like acme, knuckle, buttress etc. Proportions of threads. Left hand and Right hand threads, multi start threads.
  - 2 Types of bolts and nuts, type of screws, types of screw ends and heads, locking arrangements of fasteners, different locking methods, foundation bolts, eye bolts, Rag and Lewis foundation bolts.
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**7. RIVETS AND RIVETTED JOINTS :**

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Types of rivets and their proportions types of riveted joints e.g. lap joint, but joint, single or double riveted, single and double cover plates, failure of riveted joints.

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**8. GEAR AND GEARING: Various types of motion, transmission, belt, chain, pulley, drives**

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Different terms related to gear such as pitch circle, tooth thickness, pressure angle, addendum, duodenum, circular pitch, diametric pitch and module pitch etc. Basic gear calculations. Different gear systems and types of gear arrangement.

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9. Knowledge of machining processes and shop floor activities like assembly inspection, quality control etc.
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**SCHEME OF EXAMINATION**

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Paper I Theory	3 Hours	100 Marks
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**GUIDELINES FOR QUESTION PAPER SETTERS**

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|--------------|--|---------------|
| Q. no.1      | Compulsory (Objective type).                               | 20 marks      |
| Q. no.2 to 8 | Solve any five questions from Q. 2 to 8 (Subjective type). | 16 marks each |
- The paper setter should take care that (as far as possible) entire syllabus is equally covered.



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## ( MD - PAPER – II - DRAWING )

[ MD - II / DMES – III / DPDD – I ]

### THEORY SYLLABUS

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#### 1. INTRODUCTION OF DRAWING :-

Use of different drawing instrument, single stroke lettering, Gothic lettering. Types of lines. Dimensioning techniques viz:- Aligned system and Unidirectional system

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#### 2. GEOMETRICAL CONSTRUCTIONS :-

Simple geometrical construction such as bisecting a line, arc, perpendicular line, parallel line, dividing a line etc. construction of regular polygon by any one method. Internal and external tangent to a circle, machine handle.

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#### 3. SCALE :-

Types of scale, representative fraction (R.F.). Classification of scale i.e. plain scale, Diagonal scale and problems on it, conversions.

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#### 4. ENGG. CURVES :-

Construction of ellipse by arc of circle method, rectangle method, oblong method, Parabola by rectangle method, hyperbola, Cycloid, epicycloids hypocycloid, Involute etc.

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#### 5. PROJECTION OF POINT/LINE/PLANES

- a) Projection of point in four quadrant.
- b) Projection of Lines inclined to one surface plane only and lines in one quadrant.
- c) Projections of planes circular, square, rectangular, pentagonal and hexagonal shapes, inclined to one reference plane.

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#### 6. ORTHOGRAPHIC PROJECTIONS :

First Angle and third Angle projection methods, drawing orthographic from pictorial view of object.

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#### 7. ISOMETRIC PROJECTIONS :-

Isometric scale construction, drawing isometric views from orthographic projections

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#### 8. SECTIONAL VIEWS :-

Types of sections like full section, half section, offset sections etc. Interpretation of views i.e. Missing views

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#### 9. FREEHAND SKETCHES :-

Application of nuts, bolts, rivets, riveted joint. Screw threads, split pins, keys, couplings etc.

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#### 10 ASSEMBLY DRAWING :-

Study the drawings of component of assembly and their relative position in the assembly Assemble the parts and prepare orthographic drawing such as elevation plan, side view inclusive of section and half section views. Prepare the bill of materials.

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**11. READING OF ENGINEERING DRAWING**

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**12. VARIOUS FINISHING SYMBOLS & MACHINING SYMBOLS, GENERAL SYMBOLS**

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**SCHEME OF EXAMINATION**

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Paper II Drawing	4 Hours	100 Marks
Sessional Marks		100 Marks

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**GUIDELINES FOR QUESTION PAPER SETTERS**

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- Q. no.1      Compulsory (Objective type).      20 marks  
Q. no.2 to 8      Solve any five questions from Q. 2 to 8 (Subjective type).      16 marks each
- The paper setter should take care that (as far as possible) entire syllabus is equally covered.



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## CERTIFICATE COURSE PIPING DRAFTING & DESIGNING ( PDD ) PAPER - I

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**EXAM SCHEME:**            **THEORY PAPER – I - 100 MARKS – 3 HRS.**  
   **(DRAWING) PAPER – II –100 MARKS – 3HRS.**

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[ PDD - I / DPDD – II ]

### THEORY SYLLABUS

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#### **INTRODUCTION**

1) Introduction to Piping 2) Role of Piping Draftsman and its need in the industries 3) Scope of work for Piping Drafting and Design 4) Definition of piping, its description and its uses 5) Pipe material manufacturing methods 6) Different codes and specifications 7) Piping abbreviations 8) Pipe data tables 9) Type of pipe joints and its ends 10) Comparison of piping verses machine drawing 11) Types of drawings 12) Concepts and symbols used in piping drawings 13) Scales used for piping drawing.

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#### **FITTINGS OR PIPING COMPONENTS**

1) Pipe fittings 2) Special fittings 3) Valves 4) Other components

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#### **INSULATION**

1) Purpose of insulation 2) Insulation material 3) Requirement of insulation 4) Heat conservation

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#### **INSTRUMENTATION**

1) Basic function of instruments 2) Instrument identification 3) Instrument symbols 4) Instrument piping

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#### **STEAM TRACING OF PROCESS LINES**

1) Scope 2) Design 3) Steam pressure 4) Basic details 5) Sizing of steam tracers 6) Steam supply to tracers 7) Steam tracing of valves

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#### **PROCESS PLANT TERMS**

1) Refinery 2) Gasoline plant 3) Hydrocarbon 4) Chemical plant 5) Tank farm

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#### **PROCESS PLANT UTILITIES**

1) Steam 2) Condensate 3) Fuel oil 4) Instrument air 5) Utility air 6) Cooling water 7) Drains 8) Flair system

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#### **PROCESS PLANT EQUIPMENTS**

1) Vessel 2) Over head accumulator 3) Exchanger 4) Pumps 5) Compressor 6) Fired heater 7) Boiler 8) Storage tanks

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#### **DIFFERENT DIAGRAMS**

1) Block Flow Diagram ( BFD ) 2) Process Flow Diagram ( PFD ) 3) Piping and Instrumentation Diagram ( P & ID ) 4) Plot Plan 5) Equipment Layout 6) Piping Layout /



Schematic or General Arrangement drawing 7) Piping Isometric Drawing 8) Pipe Spool Drawing 9) Bill of material 10) Drawings from other sources

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**TIPS FOR GOOD PLANT**

1) Layout 2) Loads on structural support ( Permanent Loads , Temporary Loads , Special Loads ) 3) Supporting structure on pipe lines ( Fixed Supports , Supports movable along axis and transverse to axis 4) Platforms and Ladders 5) Foundation 6) Pipe Clamping and Supporting Devices 7) Flexible Hanger Supports and supporting span distances

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**PUMPS**

1) Type of pumps and its use 2) Methods of suction piping 3) Importance of providing jacking type support on suction and discharge side of pump

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**COMPRESSORS**

Type of Compressor and their piping

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**EXCHANGERS**

Type of Exchangers and their piping

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**PIPING ARRANGEMENTS**

1) Different arrangements of piping around Control Valve depending upon space limitations  
2) Tower 3) Piping for Cone Roof and Floating Roof Tanks

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**PRESSURE RELIEVING DEVICES**

1) Safety Valve inlet piping 2) Safety Valve discharge piping 3) Block Valve 4) Hazardous Fluids 5) Drain hole plug 6) Flashing Liquids 7) piping support 8) Back pressure

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**GUIDELINES FOR QUESTION PAPER SETTERS**

Q. no.1	Compulsory (Objective type).	20 marks
Q. no.2 to 8	Solve any five questions from Q. 2 to 8 (Subjective type).	16 marks each

The paper setter should take care that (as far as possible) entire syllabus is equally covered.



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

[ PDD - II / DPDD – III ]

## PAPER - II : PIPING DRAWING

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### List of drawings

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- 1) Process Equipment symbols
- 2) Symbols for pipe fittings and valves
- 3) Schematic or Block Flow Diagram ( BFD )
- 4) Process Flow Diagram ( PFD )
- 5) Piping and Instrumentation Diagram ( P & ID )
- 6) Equipment arrangement Layout
- 7) Equipment Data Sheet
- 8) Different arrangement of control stations
- 9) Plot Plan
- 10) Pipe Rack arrangement and pipe spacing
- 11) General Arrangement Drawing ( GA ) / Piping Layout
- 12) Pipe Isometric Drawing / Pipe spool drawing
- 13) Pipe modeling symbols
- 14) Pipe 3d modeling
- 15) Pipe projection exercise
- 16) Preparation of Isometric pipe drawing from GA with B.O.M.
- 17) Preparation of Orthographic drawing from Isometric drawing
- 18) Isometric to Orthographic exercise
- 19) Orthographic to Isometric exercise
- 20) Preparation of pipe sketch with B.O.M.

### **SCHEME OF EXAMINATION**

Paper I Theory	3 Hours	100 Marks
Paper II Drawing	4 Hours	100 Marks
Sessional Marks		100 Marks



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## CERTIFICATE COURSE CNC PROGRAMMING ( CNC )

**EXAM SCHEME: THEORY PAPER – I - 100 MARKS – 3 HRS.  
THEORY PAPER – II - 100 MARKS – 3HRS.**

### PAPER - I THEORY SYLLABUS

- \* NC , CNC & DNC Machines
- \* Advantage & Disadvantage of CNC machines
- \* Parts suitable for CNC machine
- \* Classification of CNC machines, according to number of axis, feedback control & control system features
- \* Axis identification of CNC machines
- \* Process planning
- \* Special features of CNC machines ,machines structure, slide ways , servo motor ,Ball lead screw, ATC, Tool and work holding devices, computerized control unit
- \* Key board details of computer unit and operational panel.
- \* Safety precautions, operational requirements for CNC machine Tools, tools offset, jaw turning ,jaw boring etc.
- \* Specifications of CNC machine
- \* Safety precautions
- \* Speed : cutting speed, feed, machining time with formula, cycle times & its advantages, knowledge of tooling, materials, tool holders, adopters
- \* Listing co-ordinates of job
- \* CNC words
- \* G codes and M codes
- \* Canned cycles used in CNC as per Fanuc Control System.
- \* Work zero, machine zero and zero shift.

#### SCHEME OF EXAMINATION

Theory One paper	3 Hours	100 Marks
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#### GUIDELINES FOR QUESTION PAPER SETTERS

Q. no.1	Compulsory (Objective type).	20 marks
Q. no.2 to 8	Solve any five questions from Q. 2 to 8 (Subjective type).	16 marks each

The paper setter should take care that (as far as possible) entire syllabus is equally covered.

**Note : No Programming problems should be asked in P-I (Only Theory base) questions.**

# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## (CNC - PAPER – II)

### THEORY SYLLABUS

- \* Part of Programming in CNC words with programming Format.
- \* Co-ordinate Systems
- \* Preparatory Functions and Programming formats of them
- \* Miscellaneous functions (M codes)
- \* Use of M codes in programming
- \* Simple Programming examples of drilling ,milling and lathe machines
- \* Use of G40, G41 and G42 codes
- \* Study and use of Canned cycles in CNC lathe and milling machine as per Fanuc Controls
- \* Programming using Canned cycles in lathe machines
- \* Programming using canned cycles in milling and drilling machines
- \* Main Programs and sub- Programs
- \* Examples on Programming
- \* Introduction to Computer Aided Programming
- \* Advantages of Computer Aided Programming
- \* Selection of cutting parameters

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#### **SCHEME OF EXAMINATION**

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Theory Two paper	3 Hours	100 Marks
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#### **GUIDELINES FOR QUESTION PAPER SETTERS**

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Q. no.1	Compulsory (Objective type).	20 marks
Q. no.2 to 8	Solve any five questions from Q. 2 to 8 (Subjective type).	16 marks each

The paper setter should take care that (as far as possible) entire syllabus is equally covered.

**Reference Book : Shri. Avinash Ladge.**



**INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI**  
**DIPLOMA MECHANICAL ENGINEERING SERVICES**  
**(DMES)**

<b>THEORY</b>		
<b>PAPER I</b>	Syllabus for this paper is same as Certificate Course in FITTER [ F ]	100 Marks
<b>PAPER II</b>	Diploma Paper II is given below	100 Marks
<b>PAPER III</b>	same as Certificate Course MECHANICAL DRAUGHTSMAN PAPER – II	100 Marks
<b>PAPER IV</b>	Diploma Paper IV is given below	100 Marks
<b>PRACTICALS</b>		
<b>PRACTICAL I</b>	Practical syllabus is same as FITTER	100 Marks
	Sessional Drawing Marks ( Internal )	50 Marks
	Sessional Job work ( Internal )	50 Marks
	<b>Total</b>	<b>600 Marks</b>

# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## WORKSHOP TECHNOLOGY – II

( DMES - PAPER – II )

### THEORY SYLLABUS

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#### 1. MACHINES:

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##### **A. LATHES**

1. Different types of lathe machine a. Turret, b. Capstan, c. Automatic d. Semi – automatic.
2. Identification & functions of lathe machines.
3. Speed and feed change arrangements
4. Different operations performed on lathe machine.

##### **B. MILLING MACHINE**

1. Different types of milling machines.
2. Elements of milling machines.
3. Milling cutter (a) Related terms (b) Classifications.
4. Indexing, indexing method and its calculations
5. Different operations performed on milling machine.

##### **C. SHAPING MACHINE**

1. Identification and function, main features
2. Explanation quick return motion and stroke setting
3. Clapper box and tool
4. Machining methods for horizontal, vertical and inline surfaces.
5. Method of setting up work.

##### **D. GRINDING MACHINE :**

1. Standard types of grinding machines and their use.
2. The abrasive wheel
3. Simple consideration of cutting action.
4. Choice of wheel.
5. Wheel balancing and dressing

##### **E. DRILLING MACHINE**

1. Different types of drilling machines
2. Types of drills and its materials
3. Drilling operations
4. Tool and work holding devices

##### **F. C.N.C. MACHINES**

1. Operations of C.N.C. machines
2. Fundamental components and its function
3. Types of C.N.C
4. (a) Point to point control (b) Continuous path control
5. Types of N.C. system and its function  
a) Open loop                      b) Closed loop
6. Advantage & disadvantage of C.N.C.

## **G. NON TRADITIONAL MACHINES**

1. Introduction
2. Classification of machining process
  - \* Abrasive jet machining process (AGM)
  - \* Ultrasonic machining (USM)
  - \* Chemical machining (CM)
  - \* Electro Chemical machining (ECM)
  - \* Electro Chemical grinding (ECG)
  - \* Electric discharge machining (EDM)
  - \* Electron beam machining (EBM)
  - \* Leaser beam machining (LBM)
  - \* Plasma arc machining (PAM)
  - \* Ion beam machining (IBM)

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## **2. WORKSHOP LAY OUT: Definition and advantages of shop layout**

1. Types of building in which plant is installed.
2. Method of mounting and aligning machine on beds.
3. Test to be required after erection of machine in shop.
4. Products layout and process lay out.

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## **3. SURFACE FINISHING PROCESS & COATING :**

1. Necessity of surface finish.
2. Advantage of surface finish.
3. Methods of surface finishing such as grinding, lapping, honing, buffing Super finishing etc.
4. Advantages of coating.
5. Method of surface preparation, Metal spraying.
6. Method of coating such as galvanizing, electroplating, Zinc plating, Powder coating, anodizing, hot dipping.
7. Advantages of painting.
8. Method of painting.

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## **4. MACHINING PROCESS :**

Subtraction, Addition, Non-subtraction, Non-Addition, machining such as shaping, slotting, milling, drilling etc.

Addition process : Such as welding, brazing, soldering, plating etc.

Non-subtraction, Non-addition processes : Bending, Twisting, Forging, Shearing, pressing etc.

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## **5. HEAT TREATMENT :**

- 1) Necessity & purpose of heat treatment
- 2) Advantage of heat treatment
- 3) Method of heat treatment : Annealing, Normalising, Hardening, Tempering case hardening.

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## **6. MATERIAL HANDLING, CONVEYING & STORING SYSTEM**

General terms loading, unloading shifting, various equipment's used for shifting loads. Eq. Crow bar, Lever, Magnetic blocks, Rope, Pulley, Hoist, Jacks, Cranes, Fork lift, Conveyers belts, winch etc.

Various storing systems used for solids liquids & gaseous materials classification & storing materials safety precautions.

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## **7. MAINTENANCE ACTIVITIES**

Maintenance definition, Different types of maintenance preventive maintenance, Aim & Basic activity, Break down maintenance.

Planning of maintenance schedule Maintenance of machinery's & material handling equipment's.

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**8. TRANSMISSION OF POWER AND MOTION**

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Methods of drive : Belt drive, Rope drive, Gear drive, Gear and its type

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**9. INTRODUCTION TO HYDRAULICS AND PNEUMATICS**

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**10. COMPUTER AIDED PROCESS:**

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CAD, CAM & CIM, Computer Aided Drafting, Computer Aided Manufacturing and Computer Integrated Manufacturing.

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**SCHEME OF EXAMINATION**

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Theory One paper	3 Hours	100 Marks
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**GUIDELINES FOR QUESTION PAPER SETTERS**

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Q. no.1      Compulsory (Objective type).      20 marks

Q. no.2 to 8      Solve any five questions from Q. 2 to 8 (Subjective type).      16 marks each

The paper setter should take care that (as far as possible) entire syllabus is equally covered.





**WORKSHOP MANAGEMENT**

( DMES - PAPER – IV )

[ DMES - IV ]

**THEORY SYLLABUS**

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**SECTION – I**

**( 60 Marks )**

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1. Principle of supervision
2. Quality Control / Inspection
3. Bill of Material / Estimation
4. Job Planning
5. Basic knowledge of factory act, standard orders, ESI and provident fund act, Factory act etc.
6. Knowledge of Industrial safety accident prevention and investigation of accident
7. Concept of quality circle.
8. ISO – 9000
9. Customer service
10. Basic knowledge of tool CRIB and stores
11. Purchasing
12. Time keeping ( H.R. & Personal Department )
13. Minimum wages Act / payment of wages Act.
14. Selection of persons for jobs.
15. Decision Making
16. Job Allocation
17. Selection of workman
18. Knowledge of Apprentices Act 1961.
19. Knowledge of First Aid and First Aid box
20. Execution of power
21. Incentive Scheme
22. Time study, Method study and work study – work simplification.
23. Costing of job
24. Knowledge of labor Control.
25. Communication skill

**SECTION – II** ( 40 Marks )  
**WORKSHOP CALCULATION**

**1. UNITS & MEASUREMENT :**

Definition of unit. Types of units. Systems of units. Conversion of units of simple Quantities from one system to other.

**2. SIMPLE ARITHMETIC :**

Definitions, Simplification, Equation, Simplification of equation. Simplification of simultaneous equation.

**3. MENSURATION :**

Definition, Plain figures, Areas of simple figures, Area of polygon. Calculation of volume of solids such as Cylinder, Ring, Pyramid, Prism, Frustum of a cone.

**4. WORK POWER ENERGY :**

Definition of work, power & energy, Types of energies. Horse power, Definition, Types, Transmission of power by Belt – pulley drive, Mechanical advantage, Velocity ratio & Efficiency.

**5. CUTTING SPEED & FEED :**

Definition, Factors affecting cutting speed, Cutting speed calculation for lathe, shaper & drill machine, simple calculation.

**6. BILL OF MATERIAL :**

Bill of material for simple mechanical assembly, consisting of seven to eight items.

**SCHEME OF EXAMINATION**

Theory paper	3 Hours	100 Marks
(Section I - 60 marks & Section II - 40 marks)		

**GUIDELINES FOR QUESTION PAPER SETTERS**

Q. no.1	Compulsory (Objective type).	20 marks
Q. no.2 to 8	Solve any five questions from Q. 2 to 8 (Subjective type).	16 marks each

The paper setter should take care that (as far as possible) entire syllabus is equally covered.



**INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI**  
**DIPLOMA PIPING DRAFTING & DESIGNING**  
**(DPDD )**

<b>THEORY</b>		
<b>PAPER I</b>	Drawing paper same as Certificate Course MECHANICAL DRAUGHTSMAN PAPER – II	100 Marks
<b>PAPER II</b>	Theory syllabus same as PIPING DRAFTING & DESIGNING PAPER – I	100 Marks
<b>PAPER III</b>	Drawing Paper same as PIPING DRAFTING & DESIGNING PAPER – II	100 Marks
	<b>Total</b>	<b>300 Marks</b>

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**SCHEME OF EXAMINATION**

Paper I Drawing (MD II)	3 Hours	100 Marks
Paper II Theory	3 Hours	100 Marks
Paper III Drawing (PD)	3 Hours	100 Marks

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**GUIDELINES FOR QUESTION PAPER SETTERS**

- Q. no.1 Compulsory (Objective type). 20 marks  
Q. no.2 to 8 Solve any five questions from Q. 2 to 8 (Subjective type). 16 marks each  
The paper setter should take care that (as far as possible) entire syllabus is equally covered.



# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## DIPLOMA CNC PROGRAMMING

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**THEORY PAPER I :** Workshop Technology & Engineering Drawing 100 Marks  
Theory syllabus for this Paper is separate as given below.

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**THEORY PAPER II :** This paper is same as CNC Programming Paper I 100 Marks  
Refer this syllabus booklet Page No.19

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**THEORY PAPER III :** This paper is same as CNC Programming Paper II 100 Marks  
Refer this syllabus booklet Page No. 20

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**THEORY PAPER IV :** This paper is same as DMES IV 100 Marks  
Refer this syllabus booklet Page No. 25 & 26

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### SCHEME OF EXAMINATION

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Theory Paper - I	3 Hours	100 Marks
Theory Paper - II	3 Hours	100 Marks
Theory Paper - III	3 Hours	100 Marks
Theory Paper - IV	3 Hours	100 Marks
Sessional Marks – Engineering Drawing Sheets		50 Marks
(Internal ) CNC Prog. Journal Writing		50 Marks

**( Total : 500 Marks )**

# INDIAN TECHNICAL EDUCATION SOCIETY, MUMBAI

## DIPLOMA CNC PROGRAMMING WORKSHOP TECHNOLOGY

### THEORY SYLLABUS

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THEORY PAPER I : SECTION – I ( 50 Marks )

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#### 1. SAFETY:

- General safety, Personal safety, Mechanical tool safety, Safety rules to be observed in Workshop. First-Aid knowledge & cause of accident & its prevention.

#### 2. UNITS OF MEASUREMENTS:

- British & Metric system of units, its conversions in respect of measurements for e.g. linear, Area & volume.

#### 3. MEASURING INSTRUMENTS:

- Classification of measuring Instruments.
- Precision Instruments: - Micrometer (Out side, inside, depth gauge) Calipers: Vernier Caliper, Height Gauge, steel rule, Try square slip gauge, sine bar.
- Non-precision Instruments: Steel rule.  
Caliper: Outside, Odd leg divider, Combination set, try square Marking tools: Scriber & Scribing block, Surface plate, punches, hammers, Angle plate, Vee block, Marking Media (Persian Blue, Red Lead, Chalk).

#### 4. CUTTING TOOLS:

- Study of different cutting tools such as chisels, hacksaw blade.
- Files: Description, its material, grades, cuts & its parts uses. Specification. Care & Maintenance of files File cards, pinning of files, Special types of files such as needle files, safe edge files, hand file etc.
- Cutting tools, its uses & selection of special tools such as drill, reamers, grinding wheels, knowledge of re sharpening of these tools.
- Drill: Knowledge of standard drill sizes such as letter No. & fractional drill nomenclature of drill & important angle of drill, causes of breakage of drill. Importance of cutting speed and feed for drilling.
- Use of Tap and Die Material for Tap & Die safety precautions while tapping.

#### 5. HOLDING DEVICES:

- Work Holding Devices: Construction & use of devices such as bench vice, Machine vice, clamps, Parallel block, step block, Nuts & Bolts etc .
- Cutting tools holding Device: Knowledge of holding devices such as sockets, Sleeves, drill chucks, die stock & Top range.

#### 6. GENERAL HAND TOOLS:

Knowledge and importance of workshop, hand tools such as screw driver, Spanners, Single ended, ring spanner, pliers, mallet, soft hammer etc.

#### 7. LIMITS, FITS, TOLERANCE & INTERCHANGEABILITY:

Standard systems of limits, fits & tolerance as per Indian standard, concept of interchangeability.

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**8. JIGS & FIXTURES:**

Construction & necessity of jigs & fixture, principles of jigs & fixture, Material used for Jigs & fixtures.

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**9. GAUGES:**

Knowledge of standard gauges. Classification of gauges such as working gauges, Inspection gauges and Master gauges. Types of Gauges such as snap gauges. Thickness gauges, wire gauge, plug gauges etc.

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**10. MACHINES :****A. LATHES**

1. Different types of lathe machine a. Turret, b. Capstan, c. Automatic d. Semi – automatic.
2. Identification & functions of lathe machines.
3. Speed and feed change arrangements
4. Different operations performed on lathe machine.

**B. MILLING MACHINE**

1. Different types of milling machines.
2. Elements of milling machines.
3. Milling cutter (a) Related terms (b) Classifications.
4. Indexing, indexing method and its calculations
5. Different operations performed on milling machine.

**C. GRINDING MACHINE :**

1. Standard types of grinding machines and their use.
2. The abrasive wheel
3. Simple consideration of cutting action.
4. Choice of wheel.
5. Wheel balancing and dressing

**D. DRILLING MACHINE**

1. Different types of drilling machines
2. Types of drills and its materials
3. Drilling operations
4. Tool and work holding devices

- E. Cutting speed feed and speed – Definitions & basic calculations.

**SECTION – II  
ENGINEERING DRAWING**

**( 50 Marks )**

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**1. INTRODUCTION OF ENGINEERING DRAWING :-**

Use of different drawing instrument, single stroke lettering, Gothic lettering, Types of lines. Dimensioning techniques viz:- Aligned system and Unidirectional system

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**2. GEOMETRICAL CONSTRUCTIONS :-**

Simple geometrical construction such as bisecting a line, arc, perpendicular line, parallel line, dividing a line etc. construction of regular polygon by any one method. Internal and external tangent to a circle, Machine handle.

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**3. SCALE :-**

Types of scale, representative fraction (R.F.). Classification of scale i.e. plain scale, Diagonal scale and problems on it, conversions.

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**4. ORTHOGRAPHIC PROJECTIONS :**

First Angle and third Angle projection methods, Drawing orthographic from pictorial view of object.

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**5. SECTIONAL VIEWS :**

Types of sections like full section, half section, offset sections etc. Interpretation of views i.e. Missing views

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**6. ISOMETRIC VIEWS :**

To draw simple isometric views from orthographic projections.

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**GUIDELINE FOR PAPER SETTER :**

- |  |   |               |
|--|---|---------------|
| Q. no.1                                  | Compulsory (Objective type).                              | 18 marks      |
| <b>(18 Marks each for both sections)</b> |   |               |
| Q. no.2 to 5                             | Solve any two questions from Q. 2 to 5 (Subjective type). | 16 marks each |
| <b>(16 Marks each for both sections)</b> |   |               |

The paper setter should take care that (as far as possible) entire syllabus is equally covered.

