

Syllabus for the trade
of
TURNER
(SEMESTER PATTERN)
under
Craftsman Training Scheme (CTS)

Designed in – 2013

By
Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
Block - EN - 81 SECTOR – V, SALT LAKE CITY,
KOLKATA – 700 091

**List of members of Trade Committee meeting for the
trade of “TURNER” Held on 12.08.2010 & 13.08.2010 at CSTARI, Kolkata**

SL. NO.	NAME AND DESIGNATION S/SHRI	REPRESENTING ORGANIZATION	REMARKS
1	S.D.Lahiri, Director	C.S.T.A.R.I, Kolkata	Chairman
2	S. Bhattacharya, Director	W.B.R.E.D.A, Kolkata	Member
3	Amarnath Sanyal, Addl, Director	I.EM, Kolkata	Member
4	R. Gangopadhyay, Lecturer	Kanchrapara Railway Workshop, Eastern-Railway	Member
5	R, N. Banerjee, Director	Sunshine Power Products, Kolkata	Member
6	P. K. Ghosh, Training Manager	G.R.S.E. Ltd, Kolkata	Member
7	S. K. Pal, Manager	M/s Mascot Integrated Industry, Kolkata	Member
8	Dr. Soumen Bose, Dy, Director	Directorate of Industrial Training, WB	Member
9	Dibyendu Paul, Lecturer	Sahaj Academy, Kolkata	Member
10	Dr. Tapas Kr Majumder, Manager	B S N L, Kolkata	Member
11	S.K.Bose, Manager	Trans Bio Energy Ltd, Kolkata	Member
12	Monisha Sarkar, Asstt Manager	Trans Bio Energy Ltd, Kolkata	Member
13	Dr.K. mukhopadhyaya, Director	AGNI, Kolkata	Member
14	Anupam Bose, Manager	Geetanjali Solar, Kolkata	Member
15	A Majumder, DE	W.B.R.E.D.A, Kolkata	Member
16	Joy Chakraborty, DE	W.B.R.E.D.A, Kolkata	Member
17	Utpal Kr Roy, Supervisor	W.B.R.E.D.A, Kolkata	Member
18	A.Ghosh, Supervisor	W.B.R.E.D.A, Kolkata	Member
19	Moloy Kr Mondal, Supervisor	W.B.R.E.D.A, Kolkata	Member
20	Rudrendu Basu, Asstt. Director	W.B.R.E.D.A, Kolkata	Member
21	S.K.Biswas, Asstt Director	W.B.R.E.D.A, Kolkata	Member
22	D.K.Hazra, Spervisor	W.B.R.E.D.A, Kolkata	Member
23	A.Karmakar, Supervisor	W.B.R.E.D.A, Kolkata	Member
24	Gautam Banerjee, Manager	ESAB India Ltd, Kolkata	Member
25	M.K.Saha, Trg Superintendent	G.R.S.E. Ltd. Kolkata	Member
26	P.Majumder, Chief Consultant	Park Chember Housing Development, Kolkata	Member
27	Rabin Debnath, Asstt. Director	Directorate of Industrial Training, WB	Member
28	Sib Chandra Pal, Instructor	Govt, ITI, Howrah Homes, WB	Member
29	D.P.Sarkar, Instructor	Govt, ITI, Howrah Homes, WB	Member
30	Anil Kumar, Joint Director of Trg	C.S.T.A.R.I, Kolkata	Member
31	L. K. Mukherjee, Dy.Director of Trg	C.S.T.A.R.I, Kolkata	Member
32	A. Nandi, Dy.Director of Trg	C.S.T.A.R.I, Kolkata	Member
33	N.Nath, Asstt. Director of Trg	C.S.T.A.R.I, Kolkata	Member
34	P.K.Dutta, Asstt. Director of Trg	C.S.T.A.R.I, Kolkata	Member
35	S. B. Sarder, Asstt. Director of Trg	C.S.T.A.R.I, Kolkata	Member
36	R. N. Manna, Trg. Officer	C.S.T.A.R.I, Kolkata	Member
37	L. M. Pharikhal, Trg-Officer	ATI, Kolkata	Member

List of members attended the Workshop to finalize the syllabi of existing CTS into Semester Pattern held from 6th to 10th May'2013 at CSTARI, Kolkata.

Sl. No.	Name & Designation	Organisation	Remarks
1.	R.N. Bandyopadhyaya, Director	CSTARI, Kolkata-91	Chairman
2.	K. L. Kuli, Joint Director of Training	CSTARI, Kolkata-91	Member
3.	K. Srinivasa Rao, Joint Director of Training	CSTARI, Kolkata-91	Member
4.	L.K. Mukherjee, Deputy Director of Training	CSTARI, Kolkata-91	Member
5.	Ashoke Rarhi, Deputy Director of Training	ATI-EPI, Dehradun	Member
6.	N. Nath, Assistant Director of Training	CSTARI, Kolkata-91	Member
7.	S. Srinivasu, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
8.	Sharanappa, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
9.	Ramakrishne Gowda, Assistant Director of Training	FTI, Bangalore	Member
10.	Goutam Das Modak, Assistant Director of Trg./Principal	RVTI, Kolkata-91	Member
11.	Venketesh. Ch. , Principal	Govt. ITI, Dollygunj, Andaman & Nicobar Island	Member
12.	A.K. Ghate, Training Officer	ATI, Mumbai	Member
13.	V.B. Zumbre, Training Officer	ATI, Mumbai	Member
14.	P.M. Radhakrishna pillai, Training Officer	CTI, Chennai-32	Member
15.	A.Jayaraman, Training officer	CTI Chennai-32,	Member
16.	S. Bandyopadhyay, Training Officer	ATI, Kanpur	Member
17.	Suriya Kumari .K , Training Officer	RVTI, Kolkata-91	Member
18.	R.K. Bhattacharyya, Training Officer	RVTI, Trivandrum	Member
19.	Vijay Kumar, Training Officer	ATI, Ludhiana	Member
20.	Anil Kumar, Training Officer	ATI, Ludhiana	Member
21.	Sunil M.K. Training Officer	ATI, Kolkata	Member
22.	Devender, Training Officer	ATI, Kolkata	Member
23.	R. N. Manna, Training Officer	CSTARI, Kolkata-91	Member
24.	Mrs. S. Das, Training Officer	CSTARI, Kolkata-91	Member
25.	Jyoti Balwani, Training Officer	RVTI, Kolkata-91	Member
26.	Pragna H. Ravat, Training Officer	RVTI, Kolkata-91	Member
27.	Sarbojit Neogi, Vocational Instructor	RVTI, Kolkata-91	Member
28.	Nilotpall Saha, Vocational Instructor	I.T.I., Berhampore, Murshidabad, (W.B.)	Member
29.	Vijay Kumar, Data Entry Operator	RVTI, Kolkata-91	Member

GENERAL INFORMATION

1. Name of the Trade : TURNER
2. N.C.O. Code No. : 835.55
3. Duration : 2 Years (4 Semesters having duration of six months each)
4. Power Norms : 16.35 KW
5. Space norms : 108 Sq.m
6. Entry Qualification : Passed 10th Class Examination
7. Unit Size (No. of Student) : 12
- 8a. Instructors Qualification : Degree in Mechanical Engineering from recognized engg. college/university with one year experience in the relevant field
- OR
- Diploma in Mechanical Engineering from recognized board of technical education with two years experience in the relevant field
- OR
- 10th class passed and NTC/NAC in the Trade of “Turner” With 3 years post qualification experience in the relevant field.
- 8b. Desirable qualification : Preference will be given to a candidate with CIC (Craft Instructor Certificate)

Note: At least one Instructor must have Degree/Diploma in Mechanical Engineering.

Syllabus for the Trade of “Turner”

First Semester

(Semester Code no. TUR - 01)

Duration : Six Month

Week No	Trade Practical	Trade Theory	Engineering Drawing	Vocational Cal. & Science
1	Introduction Training Familiarization with the Institute. Importance of trade training. Machinery used in the trade. Types of work done by trainees in the trade. Introduction of safety rules in the shop floor and to the fire fighting equipment etc. Introduction of First Aid. Operation of Electrical Mains. Awareness on occupational safety and Hazards related to the trade. Environment pollution and its effects. Systematic waste disposal related to the trade.	Importance of safety and precautions to be observed in the section as well as in the institute, causes of accident and its remedies. Importance of the trade in the industrial development of the country. Subjects to be taught and standard of proficiency to be attained. Awareness of recreational, medical leave and other facilities- necessary guidance to be provided to become familiar with the working of the Institute including stores procedures.	Occupational Safety & Health Basic safety introduction, Personal protection:- Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Use of Fire extinguishers. Visit & observation of sections.	
2	Practice on hammering, marking out, chipping, chisel grinding	Measurement, line standard and end standard, steel rule-different types, graduation and limitation. Hammer and chisel-materials, types and uses. Prick punch and scriber.	Engg. Drawing, types and their importance	Introduction of properties and uses of C.I. & W.I.
3	Filing practice on plain surfaces, right angle by filing. Use of calipers and scale measurement.	Vice – types and uses, Files-different types of uses, cut, grade, shape, materials etc. Try square-different types, parts, material used etc. Calipers-types and uses (firm joint).	Types of lines, their meaning and application as per BIS 696	Arithmetic : Fundamental operation, addition, subtraction, multiplication and division of decimals number.
4	Filing at right angle, marking & hacksawing.	Vee – block, scribing block, straight edge and its uses. Hacksaw-their types & uses.	Simple conventional symbols for material and parts as per BIS: 696.	Properties and uses of plain carbon steel and alloy steel.
5	Marking operation on flat & round job. Drilling operation. Threading with the help of taps and dies	Center punch- materials, construction & material uses. Drill machine-different parts. Hacksaw blades- sizes , different Parts. Hacksaw blades-sizes, different pitch for different materials. Nomenclature of drill. Surface plate its necessity	Uses and application of Drawing instruments in the geometrical construction angles and triangles. Geometrical construction of rectangle, square,	Faction and decimals conversion fraction to decimal and vice-versa. Properties and uses of copper, zinc, lead, tin aluminum.

		and use. Tap, - different types (Taper 2 nd and bottoming) care while tapping. Dies different types and uses. Calculation involved to find Out drill size (Metric and Inch).	circles and triangles.	
6	Getting to know the lathe with its main components, lever positions and various lubrication points as well.	Definition of machine & machine tool and its classification. History And gradual development of lathe.	Geometrical drawing of polygons and ellipse.	-do-
7	Mounting of chuck on machine spindle and unloading in various system.	Classification of lathe in Function and construction of different parts of Lathe.	-do-	Composition, Properties and uses of brass, bronze, solder , bearing metal, timber , rubber etc.
8	Turning of round stock on 4-jaw independent chuck. Use of 3-jaw self centering chuck as well.	Types of lathe drivers, merit and demerit. Description in details-head stock-cone pulley type-all geared type-construction & function. Tumbler gear set.	-do-	System of units. British, Metric & SI units for length, area, volume, capacity, weight, time angle, their conversions.
9	Progress Test.	Reducing speed-necessary & uses. Back Gear Unit –its construction and speed calculation.	-do-	Effect of alloying elements on the property of C.I. and steel
10	Grinding of R.H. and L.H., side cutting tools, checking of angles with tools angle gauge.	Orthogonal & oblique cutting, Lathe cutting tool-different types, shapes and different angles (clearances and rakes), specification of lathe tools	Free hand sketching of simple geometrical solids-cube, cone, prism, cylinder, sphere, pyramids.	Units of temperature & conversion of different system of temperature and related problems
11	Setting of lathe tools in different types of tool post following correct procedure.	Different types of lathe tool posts Function of quick change gear box, feed shaft, lead screw etc.	Standard printing style for letters & numbers as per BIS : 696	Mass, volume, density, specific gravity & specific weight, S.I., M.K.S. and F.P.S. units of force, weight etc., their conversion & related problems.
12	Facing operation to correct length, center drilling operation,. Grinding of “V” tools.	Combination drill-appropriate selection of size from chart of combination drill. Drill, chuck- its uses.	Free hand practice of printing style for standard letters and number.	-do-
13	Parallel turning practice-measurement with scale and caliper.	Cutting speed, feed depth of cut, calculation involved-speed feed R.P.M. etc. recommended for different materials.	Scales construction of plain scale. R.F.(Representative fraction).	Inertia, rest and motion, velocity and acceleration.
14	Step turning with + 0.08 mm measurement with vernier caliper.	Vernier caliper-its construction, principle graduation and reading,	Construction of diagonal scale.	Concept of scalar & vector quantity with example.

		least count etc. Digital vernier caliper.		Newton's Law of motion.
15	Parallel turning practice measurement with micrometer within ± 0.08 mm accuracy.	Outside micrometer – different parts, principle, graduation, reading, construction. Digital micrometer.	Simple dimensioning technique; size and location of dimension for parts, holes, angles taper, screws etc. as per IS: 696	Power and Roots Factor, power, base exponents.
16	Step turning practice within ± 0.08 mm with SQ, shoulder, U/cut, feel of micrometer, sources of error with micrometer	Different types of micrometer, Outside micrometer. Vernier scale graduation and reading. Sources of error with micrometer & how to avoid them. Use of digital measuring instruments.	Transferring measurement for linear, angular, circular dimension from the given objects to the related free hand sketches using different measuring instruments.	Multiplication and division of power and root of a number.
17	Drilling on Lathe-step drilling, drill grinding practice.	Lathe accessories, chuck independent, self centering, collet, magnetic etc., its function, construction and uses.	Pictorial drawing of isometric drawing of simple geometrical solids	Square root by arithmetic and problems.
18	Boring practice-Plain & step, use of inside micrometer-with ± 0.08 mm accuracy	Drills-different parts, types, size etc., different cutting angles, cutting speed for different material. Boring tool. Counter -sinking and Counter boring.	-do-	Work, Energy and Power, their units-related problems
19	Bore (Plain) measurement with inside micrometer ± 0.08 mm.	Letter and number drill, core drill etc.	Oblique projection of simple geometrical solids	H.P., I.H.P. and B.H.P., Efficiency and related problems
20	Boring & internal recessing	Driving plate. Face plate & fixed & traveling steadies-construction and use. Transfer caliper-its construction and uses.	-do -	Percentage, changing percentage to decimal and vice-versa.
21	Checking alignment of lathe centers. Mounting job in between centers	Lathe centers-types and their uses. Lathe carrier-function, types & uses.	Isometric drawing of simple machined & casting block	Problem on percentage related to trade
22	Reaming in lathe using solid and adjustable reamer.	Reamers-types and uses. Lubricant and coolant-types, necessity, system of distribution, selection of coolant for different material: Handling and care.	-do -	Meaning of stress, strain, modulus of elasticity.
23	Knurling practice in lathe (Diamond, straight, helical & square)	Knurling meaning, necessity, types, grade, cutting speed for knurling.	-do-	Ultimate strength, different types of stress, factor of safety and examples.
24	Turning practice-between centers on mandrel (Gear	Lathe mandrel-different types and their uses.	Free hand sketching of trades	

	blanks). Fitting of dissimilar materials-H.S.in brass, aluminium, in cast iron etc	Concept of interchangeability, Limit, Fit and tolerance as per BIS :919-unilateral and bilateral system of limit, Fits-different types, symbols for holes and shafts. Hole basis & shaft basis etc. Representation of Tolerance in drawing.	related hand tools , cutting tools, measuring instruments	-do- Ratio and proportions and related problems, direct proportion and indirect proportion
25	(i)Project Work, (ii)Industrial Visit (Optional)			
26	Examination			

Syllabus for the Trade of "Turner"

Second Semester
(Semester Code no. TUR - 02)
Duration : Six Month

Week No	Trade Practical	Trade Theory	Engineering Drawing	Vocational Science & Calculation
01	Taper turning by offsetting tailstock method	Taper – necessity, different methods of expressing tapers. Different standard tapers, method of taper turning, important dimensions of taper, Principle of setting the work & the tailstock, calculation involving the tailstock offset method- Advantage & Disadvantage	-do-	Simple machines-principle, velocity ratio, mechanical advantage, efficiency, simple problem.
02	Taper turning by offsetting tailstock method.	-do-	-do-	Simple machines principle-Velocity ratio, mechanical advantage, efficiency. Simple Problems
03	Taper turning by compound slide swiveling	Taper turning by swiveling compound slide, its calculation. Advantages & disadvantages	Orthographic drawing-application of both the first angle and third angle method in representing the drawing for simple and complex machine blocks given for exercises with dimensions.	Fundamental Algebraic Operations : Sign & symbols used in algebra.
04	-do- (bevel gear blank)	Vernier bevel protractor-its function, Construction & reading	-do-	Algebraic addition, subtraction, multiplication division.
05	Taper turning by taper turning attachment practice (Male & Female).	Taper turning by taper turning Attachment-principle setting, advantages & disadvantages, calculation involved.	-do-	Power & laws of exponent.
06	-do-	-do-	-do-	Algebraic-simplification problems
07	Taper turning by form tool	Different types of form tool &	Standard method	Simple machine like

	(Int. & Ext.) (Taper matching)	their uses.	as per BIS: 696. Exercises for different sectional views on the given orthographic drawing of machine parts, castings etc	Winch, Pulley and compound axle etc.
08	Eccentric marking practice- Eccentric turning- External use of Vernier height Gauge.	Combination set-square head. Center head, protractor head- its function construction and uses.	-do-	Factor and equation: Algebraic formulae.
09	Eccentric turning practice- External and internal.	Gauge-definition-different types plug and ring gauge, filler gauge angle gauge and radius gauge.	-do-	Factor and different types of factorization.
10	Eccentric boring, position boring.	Vernier height gauge, function, description & uses, templates-its function and construction.	-do-	Equation: simple simultaneous.
11	Eccentric boring & position boring. Grinding of threading tool (external.)	Screw thread-definition, purpose & its different elements. Fundamentals of thread cutting on lathe.	Conversion isometric drawing to orthographic drawing and vice versa related problems such as Vee blocks, simple stepped blocks , blocks oriented by various machining operations etc.	Equations simple, simultaneous, quadratic. Application, construction and solution of problems by equations.
12	Screw thread cutting (B.S.W) external R/H & L/H, checking of thread by using screw thread gauge.	Different types of screw thread- their forms and elements.	-do-	Atmospheric pressure, pressure gauge, gauge pressure and absolute pressure and their units.
13	Screw thread cutting (B.S.W) internal R/H & L/H	Different methods of forming threads . Calculation involved in finding core dia., gear train (simple gearing) calculation.	-do-	Logarithms and use of logarithms tables & anti-logarithms tables.
14	Fitting of male & female threaded components	Calculation involving driver-driven, lead screw pitch and thread to be cut. Tread chasing dial function, construction and use.	-do-	Problem related to trade using logarithm tables.
15	Screw thread cutting (External) metric thread-tool grinding	Calculation involving pitch related to ISO profile.	-do-	-do-
16	Use of hand chaser practice on thread (Ext. & Int.) non-ferrous material	Hand chaser-types, uses etc. Dies-different types, Die stock.	Surface development of solids of simple geometrical solids-cube,	-do-

			rectangular block, cone, pyramid, cylindrical prism etc.	
17	Screw thread (Internal) metric & tool (Internal threading) grinding	Conventional chart for different profiles, metric, B.A., Withworth, pipe etc.	-do-	Specific Gravity-principle of Archimedes.
18	Fitting of male and female thread components (Metric)	Calculation involving gear ratios and gearing (compound gearing)	-do-	Relation between specific gravity & specific weight.
19 - 20	Tool grinding for Square thread (External), Square thread (External) practice Tool grinding for Square thread (Internal), Square thread (Internal) practice	Calculation involving tool size, core dia., pitch proportion, depth of cut etc.of sq. thread..	Interpretation of solids and conventional curve on drawings.	Geometry: Fundamental geometrical definition of angle and properties of triangle. Triangle and properties. Pythagoras Theorem , properties of similar triangles.
21	Fitting of male and female square threaded components.	Basic process of soldering, welding and brazing.	Solution of NCVT test papers	Revision.
22	Acme threads cutting (male & female) & tool grinding.	Calculation involved - depth, core dia., pitch proportion etc. of Acme thread.	Sketches of simple pipe union with a simple pipe line drawings.	-do-
23	Fitting of male and female threaded components	Calculation involved depth, core dia., pitch proportion, use of buttress thread.	-do-	Solution of NCVT test papers
24	Buttress thread cutting (male & female) & tool grinding. Fitting of male & female threaded components.	Buttress thread cutting (male & female) & tool grinding	Solution of NCVT test papers	-do-
25	(i)Project Work, (ii)Industrial Visit (Optional)			
26	Examination			

Syllabus for the Trade of “Turner”

Third Semester (Semester Code no. TUR - 03) Duration : Six Month

Week No	Trade Practical	Trade Theory	Engineering Drawing	Vocational Science & Calculation
01	Introduction to various components produced on lathe. Forging practice (lathe tool) of different shapes,	Review of lathe machine, its classification for productivity. Revision of first year topics. Cutting tool material- H.C.S.,H.S.S., Stellite,	Screw threads, their stand and forms as per BIS, external & internal thread convention on the features for drawing.	Solid figures-Prism, cylinder, pyramid, cone

	heat treatment of tools.	Tungsten. Carbide, Ceramic etc, -Constituents and their percentage. Tool life required, quality of a cutting material.		
02	Form turning practice (by hand) Grinding and setting of parting off tool on tool post	Form tools-function-types and uses, Template-purpose & use. Dial test indicator-construction & uses Calculation involving modified rake and clearance angles of lathe tool at above and below the center height. Subsequent effect of tool setting.	Sketches for bolts, nuts, screws and other screwed Members	Frustum of Prism, cylinder
03	Grinding up of various shape of chip breaker on tool	Jig and fixture-definition, type and use. Chip breaker on tool-purpose and type	Standard rivet form as per BIS	-do-
04	Taper turning by taper turning attachment, Morse taper- different number.	Sine bar-construction-types and use. Slip, uses and selection. gauges-types.	Riveted joints-lap and butt.	Frustum of Pyramid
05	Internal taper turning by taper turning attachment. Taper matching exercise (application of Prussian blue, Plug and Ring gauge)	Checking of taper with sine bar and roller-calculation involved	Sketching of keys, cotter and pin joints.	-do-
06	Turning and boring practice on C.I. block & tip brazing on shank.	Method of brazing solder, flux used for tip tools.	-do-	Frustum of cone
07	Turning at high speed using tungsten carbide tools including throw-away tips	Cutting speed, feed, turning time, depth of cut calculation, cutting speed chart (tungsten carbide tool) etc Basic classification of tungsten carbide tips.	Concept of preparation of assembly drawing and detailing. Simple assemblies & their details of trade related tools/jobs/exercises from the given samples, models. Tool post for the lathe with washer & screws	-do-
08	Practice of negative rake tool on non-ferrous metal.	Tool life, negative top rake-its application and performance with respect to positive top rake	-do-	Frustum of sphere, spherical segment.
09	Balancing, mounting & dressing of grinding wheel (Pedestal). Adjustment of tool post.	Lubricant-function, types, sources of lubricant. Method of lubrication. Dial test indicator use for parallelism and concentricity etc. in respect of lathe work Grinding wheel abrasive, grit, grade, bond etc.	-do-	Material weight and problems related to trade.
10	Periodical lubrication procedure on lathe, testing of accuracy of alignment. Procedure of checking accuracy of lathe. Preventive maintenance of	Preventive maintenance, its necessity, frequency of lubrication. Preventive maintenance schedule., TPM (Total Productive	Details and assembly of Vee-blocks with clamps	Trigonometry : Trigonometrical ratios, use of trigonometrical tables.

	lathe.	Maintenance), EHS (Environment, health, Safety)		
11	Industrial visit to different industries to gather knowledge about the machinery, operations etc. which are not available/Performed in the Institute i.e. special purpose lathe, programmed control machine etc.			
12	Crankshaft – single throw (Desirable)	Marking table-construction and function. Angle plate-construction, eccentricity checking.	Details and assembly up Vee-blocks with clamps.	Area of triangle by trigonometry.
13	Turning of long shaft (using steadies) (within a 0.03 mm).	Roller and revolving steadies, Necessary, construction, uses etc.	Details and assembly of shaft and pulley.	Finding height and distance trigonometry
14	Cutting metric threads on inch, lead screw and inch threads on Metric Lead Screw.	Calculation involving gear ratios metric threads cutting on inch L/S Lathe and vice-versa.	-do-	Application of trigonometry to related problems.
15	Use of attachments on lathe for different operations.	Different types of attachments used in lathe.	Details and assembly of Bush Bearing.	-do-
16	Thread cutting on non-ferrous metals-copper aluminum brass etc.	Various procedures of thread measurement thread screw pitch gauge. Screw thread micrometer, tool maker, microscope etc.	-do-	Triangle of forces, Parallelogram of forces.
17	Advanced eccentric boring (position boring using tool maker's button.)	Tool maker's button and its parts, construction and uses, telescopic gauge its construction and uses.	Details and assembly of simple coupling	Composition and resolution of force.
18	Boring and stepped boring (within q 0.05 mm)	Inside micrometer principle, construction graduation, reading, use etc. (Metric & Inch.)	-do-	Representation of forces by vectors-simple problems on lifting tackles like jib cranes.
19	Continuation of thread cutting. Fractional odd & even threads.	Calculation involving fractional threads. Odd & even threads.	Details and assembly of simple hand vice.	-do-
20	Multiple thread cutting (B.S.W.) external & internal.	Multiple thread function, use, different between pitch & lead, formulate to find out start, pitch, lead. Gear ratio etc.	Details and assembly of a simple hand vice.	Moment of a force couples. Simple problems on straight and bell cranked lever.
21	Multiple thread cutting 60 deg. (external & internal)	Indexing of start - different methods tool shape for multi-start thread. Setting of a lathe calculation for required change wheel	-do-	Centre of gravity. Simple experimental determination. Equilibrium - Stable, unstable and neutral equilibrium - simple explanation.
22	Multiple thread cutting Acme form (Male & Female)	Calculation involving shape of tool, change wheel, core dia etc.	-do-	-do-
23	Multiple thread cutting square form (Male & Female)	Calculation involving shape, size pitch, core dia. Etc.	Blue print reading - Simple exercises related to missing lines.	Fraction - Co-efficient of friction.
24	Multiple thread cutting, square form (Male & Female) Multiple thread	Helix angle, leading angle & following angles. Thread dimensions-tool	-do-	Simple problems related to friction. Magnetic substances-

	cutting work (External). Cutting of helical grooves in bearing and bushes (Oil groove)	shape, gear, gear calculation, pitch, depth, lead etc. Heat treatment – meaning & procedure hardening, tempering, carbonizing etc. Revision & Test.		natural and artificial magnets. Methods of magnetization – uses of magnets.
25	(i)Project Work, (ii)Industrial Visit (Optional)			
26	Examination			

Syllabus for the Trade of “Turner”

Fourth Semester (Semester Code no. TUR - 04) Duration : Six Month

Week No	Trade Practical	Trade Theory	Engineering Drawing	Vocational Science & Calculation
01 & 02	Setting and operation involving face and angle plate	Accessories used on face plate –their uses. Angle plate-its construction & use. Balancing-its necessity.	Simple exercises related to missing symbols	Electricity & its uses, electrical current – positive and negative terminals
03	Turning & boring of split bearing –(using boring bar and fixture)	Care for holding split bearing. Fixture and its use in turning.	-do-	Use of fuses and switches, conductors and insulators
04	Thread on taper surface (Vee form).	Setting of tool for taper threads-calculation of taper setting and thread depth.	Simple exercises related to missing symbols.	Simple electric circuits. Simple calculation.
05	Introduction to various features of CNC machine – control switches, drive operating buttons and specification	Conceptualisation of CNC technology. Difference of CNC machines to general purpose machine & automatic machines. Advantages & disadvantages of CNC machines over GPMs. Difference between NC and CNC. Schematic diagram of CNC system	-do-	Ohm’s law-simple calculation, electrical insulating materials. Practice on simple pocket calculator.
06	Programming of CNC machines-Introduction to CNC machine, part programming with simple exercises and various programming code. Simple examples of programming and cutting	Programming – Sequence, formats, different codes, sub routines, methods, writing & editing. Geometry and Coordinate system.. IMC panel, keys and display panel. EMCO control panel. Data processing unit and Control logic unit	-do-	Mechanical properties of metals. Graphs: Abscissa and ordinates groups of straight line related two sets of varying quantities.
07	Operating the CNC machine in the manual SBL and auto mode . Programming loading and machine setting. Procedure for reaching reference point	Programming execution in different mode s like SBL, manual and auto. Knowledge on CNC cutting tools-Geometry, material, cutting speed, feed, and	-do-	Heat treatment of steel –hardening, tempering, annealing etc.

	. Setting Zero off-set G54, G55, G56, G57. switching the machine of tool off-set	depth of cut. Techniques of tool off-setting and tool setting. Prepare various programmes as per drawing.		
08 & 09	Simple work on CNC trainer lathe with parallel, taper, step, radius turning, grooving and threading of different pitches.	Tool type chart, decide the G41 and G42. Surface finish-Primary and Secondary. Surface roughness related BIS symbols	-do-	-do-
10 & 11	Introduction to conventional Milling operation. Practice on CNC Milling Machine By using different codes	Different types of milling machines and operations. Techniques of CNC programming	-do-	-do-
12	Practice on CNC drilling	Related Theory	-do-	-do-
13 to 17	Project work on lathe work- different types of circular fittings, different types of thread cutting etc.	Special lathe-copying relieving turning axle turning etc. Relieving lathe-its type operational features- calculation of gearing etc. Detailed description about the typical work and cam arrangement etc. Surface finish symbols used on working blueprints- I.S. system lapping, honing etc. Automatic lathe-its main parts, types diff. Tools used-circular tool etc.	Solution of NCVT, test paper. Revision	Heat treatment of steel Hardening, annealing, tempering, normalizing, cast hardening-standard and measurement. Transmission of power by belt pulley n& gear drive. Solution of NCVT question papers.
18	Project work-useful articles different type fittings.	Interchangeability meaning procedure for adoption, quality control procedure for quality production.	-do-	Revision
19	Project work-useful articles (different type fittings).	Interchangeability-meaning, control procedure for quality	Revision	Revision
20 to 22	Practice of different operations related to trade on CNC machine	Different types of programming techniques of CNC machine	Revision	Revision
23 & 24	Industrial training OR Project work preferably in cross sectoral trades. Work order from local industries (Production type)	Industrial training OR Project work preferably in cross sectoral trades. Solution of NCVT question papers	Industrial training OR Project work preferably in cross sectoral trades. Solution of NCVT question papers	Industrial training OR Project work preferably in cross sectoral trades. Solution of NCVT question papers
25	Revision			
26	Examination			

**LIST OF TOOLS AND EQUIPMENTS FOR THE TRADE OF TURNER
FOR THE BATCH OF 12 TRAINEES**

A : Trainees Tool Kit :

Sl. No.	Description	For Instructor	For Trainees
1	2	3	4
1	Caliper out side spring joint 150 mm	1 No	12 Nos.
2	Caliper inside spring joint 150 mm	1 No	12 Nos.
3	Caliper odd-leg firm joint 150 mm	1 No..	12 Nos.
4	Steel Rule 150 mm	1 No..	12 Nos.
5	Scriber 150mm x 3 mm	1 No.	12 Nos.
6.	Hammer ball pein 250 gm with handle	1 no.	12 Nos.
7	Centre punch 100 mm	1 no.	12 Nos.
8	Prick punch 100 mm	1 no.	12 Nos.
9	Divider spring joint 150 mm	1 no.	12 Nos.
10	Safety goggles clear glass (Good quality)	1 no.	12 Nos.

B: TOOLS, EQUIPMENTS AND GENERAL OUTFIT

Sl. No.	Description	For Instructor	For Trainees
11	Surface plate 60 x 60 cm	---	1 no.
12	Work bench 240 x 120x 90cm high	---	1 no.
13	Marking table (CI) 120 x 120 cm	---	1 no
14	Bench vice 125 mm jaw	---	6 nos.
15	Vee-Block 75 and 125 mm with clamp	---	1 pair each
16	Universal Surface gauge 250 mm arm	---	2 nos.
17	Hammer ball pein 750 gm with handle	---	6 nos.
18	Chisel cold flat 20 x 150 mm	---	6 nos.
19	Hammer copper/brass 500 gm with handle	---	12 nos.
20	Hacksaw fixed 200 mm (Pistol grip)	---	6 nos.
21	File flat 300 mm rough	---	6 nos.
22	File flat 250 mm 2 nd cut	---	6 nos.
23	File flat 250 mm smooth	---	6 nos.
24	File half round 250 mm 2 nd cut	---	6 nos.
25	File round 250 mm smooth	1 no.	6 nos
26	File half round 150 mm smooth	1 no.	2 Sets
27	Knurling tool revolving head (Rough, med, fine) diamond and straight	---	2 Sets
28	Combination set 300 mm (Complete Set)	---	6 Nos.
29	Screw Driver 200 & 300 blade heavy duty	---	2 sets each
30	Spanner double ended 6 mm to 21 mm	1 set	2 Nos
31	Spanner adjustable 200 mm	1 no.	---
32	Pliers flat nose 150 mm side cutting	1 no.	12 nos.
33	Caliper transfer inside 150 mm	---	3 nos.
34	Micrometer Outside 0 to 1” Reading 0.0001”	1 no.	----
35	Micrometer Outside 0 to 25 mm Reading 0.01 mm	1 no.	2 sets
36	Micrometer Outside 25 to 50 mm Reading 0.01 mm	----	2 nos.
37	Micrometer Outside 50to 75 mm Reading 0.01 mm	----	2 sets

38	Micrometer Inside up to 25 mm Reading 0.01 mm	1set	2 nos.
39	Micrometer Inside up to 50 to 150 mm reading 0.01 mm	-----	2 nos.
40	Depth Gauge Micrometer 0 to 150 mm Reading 0.01 mm	-----	2 nos.
41	Vernier Caliper Outside, Inside and Depth 200 mm /8 inches with metric & inch scale	1 No.	6 nos.
42	Dial Vernier Caliper with metric 200 mm reading 0.05 mm	1 No	6 nos.
43	Vernier Bevel Protractor 300 mm blade	-----	6 nos.
44	Vernier Micrometer 0 - 25 mm o/s LC 0.001mm	1 No	2 nos.
45	Vernier Micrometer 25 - 50 mm outside reading 0.001mm	1 No.	2 sets
46	Vernier Micrometer 0 inch to 1 inch. Outside Reading 0.0001 inch	1 No.	2 nos.
47	Feeler Gauge 100 mm blade metric set	---	2 sets
48	Radius Gauge 1 to 7 mm & 7.5 to 15 mm	---	6 Nos
49	Centre Gauge com. 60°, 55° and 29°	---	2 sets
50	Screw Pitch Gauge Whitworth & Metric each	---	2 sets
51	Drill Angle Gauge	---	2 sets
52	Dial Test Indicator 0.01 mm with magnetic base	---	2 sets
53	Vernier Height Gauge with dial 300 mm L.C. 0.01 mm	---	1 set
54	Try Square 150 blade	---	4 nos.
55	Magnifying Glass 75 mm dia.	---	4 nos.
56	Plain Ring and Plug Gauge 12 to 50 mm by 1mm	---	1 set each
57	Wheel Dresser Huntingon-type with star cutter	---	1 No.
58	Wheel Dresser Diamond (inserted-0.75 or 1 Carat)	---	2 Nos.
59	Screw Thread micrometer interchangeable	1 No.	1 No
60	Morse Taper Plug & Ring Gauge no. 0 to 7 MT	---	1 set
61	Sin Bar with centers 200 mm	---	2 Nos.
62	Slip Gauge metric set (87 pieces in a Box)	---	2 Nos.
63	Morse Taper Sleeves No. 0-1, 1-2, 2-3, 3-4, 4-5.	---	1 set
64	Drill Drift	---	1 Set.
65	Twist Drill straight shank 1 to 12 mm by 1 mm	---	1 No.
66	Twist Drill taper shank 10-12 mm by 0.5 mm	---	1 set (Box)
67	Drill Chuck 12 mm cap with key	---	2 Sets.
68	Tap & Die B.A. No. 0 to 10 in a box	---	2 Nos...
69	Tap & Die metric set up to 25 mm	---	2 Sets
70	Tap & Die B.S.F. up to 1 inch	---	2 Sets.
71	Tap & Die B.S.W. up to 1 inch	---	2 Sets.
72	Reamer machine straight flute 6 to 25 mm	---	1 Set.
73	Reamer Adjustable 10 to 20 mm	---	1 set.
74	Tool Holder RH & straight for mm square tool bit	---	1 No.
75	Parting Tool Holder with H.S.S. blade	---	12 Nos.
76	Tool Bits 12 X 150 mm sq. assorted shaped	---	12 Nos.
77	Boring Tool holder for 6 mm sq. tool bit	---	12 Nos.
78	Steel Rule 300 mm with Metric and Inch	---	12 Nos.
79	Oil Can ½ pint (pressure feed system)	---	12 Nos.
80	Dog Carrier 235, 50 and 75 mm	---	12 Nos
81	Angle Plate with slots 200 mm	---	12 Nos.
82	Spirit Level 0.05 meter 200 m	---	2 Nos.
83	Tool Maker's button	---	1 set
84	Combination Drill A-2.5 and A-1	---	1 set

85	Oil Stone 12 mm sq. x 100 long fine	---	12 nos.
86	Tap Wrench (adjustable)	---	12 Nos.
87	Die Handle	---	2 Nos.
88	Tool Bit assorted sizes on holder	---	2 Nos.
89	Machine Vice 100 mm jaw (For Drill Machine)	---	12 Nos.
90	Chalk Board on mobile stand	---	1 No.
91	Spare Grinding Wheel Ajax type for carbide tool	---	1 No.
92	Almirah-1980x 910 x 480 mm	---	2 No.
93	St. Locker with drawer (Pigeon holes)	---	.1 No.
94	Desk	---	1 No.
95	Stool	1 No.	4 Nos.
96	Angle Gauge for tool grinding	---	6 Nos
97	Hand Chaser M-12 & M-16 (External)	---	2 Nos.
98	Hand Chaser M-12 & M-16 (Internal)	---	2 Nos.
99	Revolving Centrer (to suit Lathe tailstock)	---	6 Nos
100	Tool Cemented carbide assorted shaped (External) for steel turning –set of 12 nos.	---	1 No.
101	Thread Plug Gauge M-20 & M-21	---	1 set
102	Thread Ring Gauge M-20 & M-21	---	1 No.
103	Machine Chase M-12TO m-21 (Std. Series) to suit on	---	1 set
104	Coventry Die head	---	2 Nos
105	Gauge Drill Grinding	---	1 No
106	Magnetic Chuck 150 mm dia.(Circular type)	---	1 set.
107	Lathe Mandrels (Diff. Types)	---	1 No.
108	Conventry Type Die Head (Self opening)	---	1 No
109	Collapsible Tap with attachment	---	2 Nos
110	Combination Drill	---	4 Nos.each.
111	Fire Extinguisher and buckets	---	12 nos. And 2 nos.

- Note : 1. No additional item of the above list are required for a batch of 12 trainees working in second shift except Serial No. 1 to 10 and lockers
- 2.The specification of the items in the above list has been given in metric units. The items, which are available in the market nearest to specification as mentioned above, should be procured.

C : MACHINERIES AND EQUIPMENTS

Sl.No.	Machinery and Equipment	Quantity	Remarks
1	2	3	4
01	Lathe S.S. & S.C. (All geared head stock) 15 cm center height, to admit 120 cm between centers. Machine to be motorized and supplied with coolant installation, 1-jaw Independent chuck 250 mm, 3-jaw self-centering chuck 150 mm, fixed steady, traveling steady, face plate, driving plate, 4-way tool post, quick change gear box for Metric or British threads, live and dead centers with taper attachments.	4 nos.	
02	Lathe S.S & S.C.(all geared type) 20 cm. Center height, 120 cm between centers, gap bed machine to be motorized and supplied with coolant installation, 4-jaw independent chuck, 300 mm , 3-jaw self-centering chuck 200 mm fixed steady, face plate, driving plate, 4-way tool post, quick change gear box for Metric/British threads, live and dead centers with taper attachments.	1 no.	

03	Lathe tool room S.S. & S.C. (all geared type) 15 cm center height, 120 cm between centers. Machine to be motorized and supplied with coolant installation, 1-jaw independent chuck 250 mm, 3-jaw self-centering chuck 150 mm fixed steady, traveling steady, face plate, driving plate, 1-way tool post, draw in type collets set up to 25 mm, 0.5 mm, relieving attachments.	1 nos.	
04	Lathe S.S. & S.C (Cone pulley type) 15 cm height 90 cm between centers. Machine to be motorized 1-jaw independent chuck 250 mm, 3-jaw self-centering chuck, 150 mm single tool post.	1 no.	For demonstration purpose.
05	Grinding machine pedestal type D.E. 150 mm dia. Wheel with wheel guard and vision.	1 no.	
06.	Grinding machine pedestal type E.E. 150 mm dia. Wheel with wheel and vision guard	1 no.	
07.	Drill machine pillar type-motorized up to 12 mm. Cap.	1 no.	
08.	Power saw machine – hydraulic feed system – 400 mm. Blade size.	1 no.	
09.	Capstan Lathe 250 mm sawing, 25 mm spindle bore with all accessories and attachment including collect chucks and sets.	1 no.	

D:List of additional machines, tools & equipment for two units (CNC)

Sl. No.	Description	Quantity
1	2	3
1	CNC Trainer Lathe	1 No.
2	CNC Turning Tools assorted	1 set
3	CNC Boring tools assorted	1 set
4	CNC Grooving tools (External & Internal)	1 set
5	VCP	1 no.
6	Color TV Monitor	1 no.
7	Related Video & Audio Cassette	as required
8	Electronic Vernier Caliper inch and mm 8"/200 mm. LCM 0.005"/0.001 mm	2 nos.
9	Dig metric electronic outside Micrometer (0 to 25 mm & 25 to 50 mm) LC 0.001 mm.	1 no. each
10	CNC Trainer Drilling	1 no.
11	CNC Trainer Miller	1 no.

Note:

- No. additional items of the above lists are to be provided for a batch of 12 trainees working in the second shift.
- List of ISI Books for the use of Instructors to be enlisted as mentioned in the syllabus.