

**ME-119: ENGINEERING DRAWING
2014-15 Semester I**

Instructions for the Students

Syllabus

The following sheets will be practiced in the Drawing Hall:

<i>Sh. No.</i>	<i>Title</i>	<i>Ref.</i>
1.	Engineering Curves (Conics, Involutives, Spirals, Cycloids, Trochoids and Helices)	Ref. 1: Ch. 6 & 7
2.	Orthographic Projections	Ref. 1: Ch. 8
3.	Projections of Points and Straight Lines	Ref. 1: Ch. 9 & 10
4.	Projections on Auxiliary Planes	Ref. 1: Ch. 11
5.	Projections of Planes	Ref. 1: Ch. 12
6.	Projections of Solids	Ref. 1: Ch. 13
7.	Sections of Solids	Ref. 1: Ch. 14
8.	Development of Surfaces	Ref. 1: Ch. 15
9.	Intersection of Surfaces	Ref. 1: Ch. 16
10a.	Isometric Projections	Ref. 1: Ch. 17
10b.	Perspective Projections	Ref. 1: Ch. 19
11.	Fabrication of 3D Objects from Cardboard	Ref. 1: Ch. 9 & 10
12.	Assembly Using Solid Works and 3D Printing	-

Note:

- *“10b. Perspective Projections” will have only lecture and no practice session; “11. Fabrication of 3D Objects from Cardboard” will have no lecture but only practice session.*
- *Sheets 1-5 will be drawn manually on A3 drawing sheets and submitted for evaluation. Sheets 6-10 will be drawn using the 2D features of AutoCAD, printed as PDF file on A3 size, verified by the TA/RA, get it printed in the A3 color printer in the Drawing Hall and submit the hardcopy for evaluation.*
- *As we do not have enough PCs, Sheets 5-10 will be worked together in groups of two. However, the instructors, TAs and RAs will ensure that both partners play active role. From subsequent semesters, these too will be done individually.*
- *Perspective views will be taught in Lecture 10b but it will have no practice session. During the Lecture 10b, instructions for Sheet 11 will also be given.*
- *Exercise 12 will be done in 3D using SolidWorks in parts and assembly. The parts will be physically realized using uPrint 3D Printer and assembled. The functional assembly will be submitted for evaluation.*

Text books:

1. N. D. Bhatt (revised and enlarged by V. M. Panchal and Pramod R. Ingle), Engineering Drawing, 50th Ed., Charotar Publishers, Anand, 2010.
2. Thomas E. French and Charles J. Vierck, Engineering Drawing and Graphic Technology, 12th Ed., McGraw-Hill, 1978.

Instructors, Venues and Slots

Divisions	Instructor	Venue	Lecture Schedule	Drawing Session Schedule
P01 & P03	KNJ/SSK	LCH-11	Wed 11:00-12:30 (6A)	Mon 9:30-12:30 (LM)
P02 & P04	KNJ/SSK	LCH-11	Fri 11:00-12:30 (6B)	Thu 9:30-12:30 (LH)
P11 & P13	KPK/UVB	LCH-12	Mon 3:30-5:00 (9A)	Tue 2:00-5:00 (L2)
P12 & P14	KPK/UVB	LCH-12	Thu 3:30-5:00 (9B)	Fri 2:00-5:00 (L4)

Note:

- Contact details of the instructors: KPK - K.P. Karunakaran (7530; karuna@iitb.ac.in); SSK - Salil S. Kulkarni (7513; salil.kulkarni@iitb.ac.in); UVB - Upendra V. Bhandarkar (7594; bhandarkar@iitb.ac.in); KNJ - Krishna N. Jonnalagadda (7538; krishnaj@iitb.ac.in).
- Practice sessions will be held in the Drawing Hall in the first floor of Transit Building.
- Slots 9A and 6A will be used for the lectures of the regular sheets. Slots 9B and 6B will be used for CAD lectures, compensation lectures when the regular lectures fall on holidays and any other special lectures. ***So, please do not commit yourselves in these slots for any other course.***

Schedule

Sheet No.	Div (P_)	Lecture			Drawing Session				
		Venue	Date and Time	Instructor	Date and Time	Instructor			
01	01&03 02&04	LCH-11	Jul 23 (W) 11:00-12:30 (6A) & Jul 25 (F) 11:00-12:30 (6B)	KNJ	Jul 28 (M) 9:30-12:30 (LM)	SSK			
	Jul 31 (Th) 9:30-12:30 (LH)								
	11&13 12&14	LCH-12	Jul 21 (M) 3:30-5:00 (9A) & Jul 24 (Th) 3:30-5:00 (9B)	KPK	Aug 02 (Sa) 2:00-5:00 (L2)	UVB			
	Aug 01 (F) 2:00-5:00 (L4)								
The lecturing for Sheet 1 will be done in two parts as (a) it is the first sheet which will require adequate time for introduction and (b) many types of curves are taught.									
02	01&03 02&04	LCH-11	Jul 30 (W) 11:00-12:30 (6A)	KNJ	Aug 04 (M) 9:30-12:30 (LM)	SSK			
	Aug 07 (Th) 9:30-12:30 (LH)								
	11&13 12&14	LCH-12	Jul 28 (M) 3:30-5:00 (9A)	KPK	Aug 05 (Tu) 2:00-5:00 (L2)	UVB			
	Aug 08 (F) 2:00-5:00 (L4)								
CAD 2D	01&03 02&04	LCH-11	Aug 01 (F) 11:00-12:30 (6B)	KPK					
	11&13 12&14						LCH-12	Jul 31 (Th) 3:30-5:00 (9B)	
	This lecture is given in the same week of the lecture for Sheet 2. Soon after this lecture, the students are urged to familiarize themselves with AutoCAD. Because, Sheets 6-10 will be done using AutoCAD. Furthermore, it will be logical to be competent in CAD 2D before the lecture of CAD 3D.								
	03	01&03 02&04	LCH-11	Aug 06 (W) 11:00-12:30 (6A)			KNJ	Aug 11 (M) 9:30-12:30 (LM)	SSK
Aug 16 (Sa) 9:30-12:30 (LH)									
11&13 12&14		LCH-12	Aug 04 (M) 3:30-5:00 (9A)	KPK	Aug 12 (Tu) 2:00-5:00 (L2)	UVB			
Aug 14 (Th) 2:00-5:00 (L4)									
04	01&03 02&04	LCH-11	Aug 13 (W) 11:00-12:30 (6A)	KNJ	Aug 18 (M) 9:30-12:30 (LM)	SSK			
	Aug 21 (Th) 9:30-12:30 (LH)								
	11&13 12&14	LCH-12	Aug 11 (M) 3:30-5:00 (9A)	KPK	Aug 19 (Tu) 2:00-5:00 (L2)	UVB			
	Aug 22 (F) 2:00-5:00 (L4)								
05	01&03 02&04	LCH-11	Aug 20 (W) 11:00-12:30 (6A)	KNJ	Aug 25 (M) 9:30-12:30 (LM)	SSK			
	Aug 28 (Th) 9:30-12:30 (LH)								
	11&13 12&14	LCH-12	Aug 18 (M) 3:30-5:00 (9A)	KPK	Aug 26 (Tu) 2:00-5:00 (L2)	UVB			
	Aug 27 (W) 2:00-5:00 (L4)								
CAD	01&03	LCH-11	Aug 22 (F) 11:00-12:30 (6B)	KPK					

3D	02&04					
	11&13	LCH-12	<u>Aug 21 (Th) 3:30-5:00(9B)</u>			
	12&14					
	<ul style="list-style-type: none"> You will work in groups of two each. Each group will be given an assembly. Its parts and assembly shall be modelled. Submission of parts and assembly models and the STL files of the parts will be done in the class of Sheet 9. These will be evaluated for full marks. If your STL files are found correct, they will be built using uPrint 3D printer and returned to you. You may assemble them and submit physical assembly in the class of Sheet 11. This part is voluntary this semester and carried no weightage. No fixed slots for this sheet. You may come during working hours when you as well as the drawing hall are free. You may also use your departmental, hostel and personal resources for this exercise. 					
Test-1	01&03	Venue: Drawing Hall		Sep 01 (M) 9:30-12:30 (LM)	SSK/	
	02&04			Sep 4 (Th) 9:30-12:30 (LH)	KNJ	
	11&13			Sep 02 (Tu) 2:00-5:00 (L2)	UVB/	
	12&14			Sep 5 (F) 2:00-5:00 (L4)	KPK	
Sep 8-13: Week of Mid-semester Examination - No lectures and practice sessions						
06	01&03	LCH-11	Aug 27 (W) 11:00-12:30 (6A)	KNJ	Sep 15 (M) 9:30-12:30 (LM)	SSK
	02&04				Sep 18 (Th) 9:30-12:30 (LH)	
	11&13	LCH-12	Aug 25 (M) 3:30-5:00 (9A)	KPK	Sep 16 (Tu) 2:00-5:00 (L2)	UVB
	12&14				Sep 19 (F) 2:00-5:00 (L4)	
07	01&03	LCH-11	Sep 3 (W) 11:00-12:30 (6A)	KNJ	Sep 22 (M) 9:30-12:30 (LM)	SSK
	02&04				Sep 25 (Th) 9:30-12:30 (LH)	
	11&13	LCH-12	Sep 1 (M) 3:30-5:00 (9A)	KPK	Sep 23 (Tu) 2:00-5:00 (L2)	UVB
	12&14				Sep 26 (F) 2:00-5:00 (L4)	
08	01&03	LCH-11	Sep 17 (W) 11:00-12:30 (6A)	KNJ	Sep 29 (M) 9:30-12:30 (LM)	SSK
	02&04				Sep 27 (Sa) 9:30-12:30 (LH)	
	11&13	LCH-12	Sep 15 (M) 3:30-5:00 (9A)	KPK	Sep 30 (Tu) 2:00-5:00 (L2)	UVB
	12&14				Sep 27 (Sa) 2:00-5:00 (L4)	
09	01&03	LCH-11	Sep 24 (W) 11:00-12:30 (6A)	KNJ	Oct 11 (Sa) 9:30-12:30 (LM)	SSK
	02&04				Oct 09 (Th) 9:30-12:30 (LH)	
	11&13	LCH-12	Sep 22 (M) 3:30-5:00 (9A)	KPK	Oct 07 (Tu) 2:00-5:00 (L2)	UVB
	12&14				Oct 10 (F) 2:00-5:00 (L4)	
10a	01&03	LCH-11	Oct 01 (W) 11:00-12:30 (6A)	KNJ	Oct 13 (M) 9:30-12:30 (LM)	SSK
	02&04				Oct 16 (Th) 9:30-12:30 (LH)	
	11&13	LCH-12	Sep 29 (M) 3:30-5:00 (9B)	KPK	Oct 14 (Tu) 2:00-5:00 (L2)	UVB
	12&14				Oct 17 (F) 2:00-5:00 (L4)	
10b	01&03	LCH-11	Oct 08 (W) 11:00-12:30 (6A)	KNJ	No practice session	
	02&04					
	11&13	LCH-12	Oct 09 (Th) 3:30-5:00 (9A)	KPK		
	12&14					
11	01&03	LCH-11	No lecture for this sheet		Oct 18 (Sa) 9:30-12:30 (LM)	SSK
	02&04				Oct 20 (M) 9:30-12:30 (LH)	
	11&13	LCH-12			Oct 21 (Tu) 2:00-5:00 (L2)	UVB
	12&14				Oct 18 (Sa) 2:00-5:00 (L4)	
Oct 27-31: Preparatory week for test-2. So, no class in this week.						
Test-2	01&03	Venue: Drawing Hall		Nov 03 (M) 9:30-12:30 (LM)	SSK/	
	02&04			Nov 05 (W) 9:30-12:30 (LH)	KNJ	
	11&13			Nov 08 (Sa) 2:00-5:00 (L2)	UVB/	
	12&14			Nov 07 (F) 2:00-5:00 (L4)	KPK	

Guidelines:

- Only the lectures will be delivered in the first week and no practice sessions. This will give a full weekend to the students of all batches to prepare.

- *When a lecture class of 6A/9A slot falls on a holiday, this will be compensated in the 6B/9B slot.*
- *When a practice session falls on a holiday, it will be compensated in the forenoon of the following Saturday.*
- *Slots 9B and 6B will be used for CAD lectures, compensation lectures when the regular lectures fall on holidays and any other special lectures.*

Contact Details

Intercom number in the Drawing Hall is 4582. Mr. Prakash A. Rokade and the RAs will be there.

- Note:*
1. *Clarify your doubts and queries as far as possible in the lecture classes itself.*
 2. *If you need to call any of us, use landlines first. Mobile numbers shall be used only as the last resort, only in true emergency. If your call to our mobile numbers is not justified, you will face penalty in grading.*
 3. *Use emails sparingly. Due to the large number, we may not be able to reply all emails.*

Implementation and Evaluation

- There will be 4 divisions, each managed by an instructor who will deliver lectures, supervise during drawing sessions and monitor performance including attendance. However, Correction of the sheets and tests and grading will be common. RAs/TAs will also be drawn from a common pool. Mr. Prakash A. Rokade will assist in the halls.
- Each topic will have contact hours in the form of (a) lecture of 1.5 hour duration and (b) drawing session of 3 hour duration. The problem sheet of any topic as well as its lecture slides will be uploaded in moodle <<http://moodle.iitb.ac.in>> before the corresponding lecture session.
- The performance of the students will be uploaded in Moodle periodically.
- Each sheet will begin with a lecture of 1.5 hours. The students shall bring the following to the lecture class:
 - Hard copy of “Sheet00: Instructions”.
 - Hardcopy of the problem sheet of the week.
 - The text book. Bringing the hard copy of the lecture slides is optional.
 - Sketch book.
 - Drawing instruments sans mini-drafter.
- In order to space the lecture and practice session for any sheet by a weekend, only lecture of Sheet 1 will be delivered in the first week of the semester. The practice sessions will be from the second week.
- Each problem sheet will have several problems. Students shall practice these problems well in advance on a sketch book before coming to the drawing hall. A set of randomly

selected problems from the sheet by the instructor of the practice session shall be solved very neatly on A3 sheets in the Drawing Hall.

- Each page of the A3 sheets used in the class shall have borders. Only the first page needs to have the name plate as specified; in all other odd pages, it is enough to write the roll number of the student neatly at the bottom right inside a box. Multiple sheets shall be stapled.
- A3 sheets for these problems to be solved in the drawing hall will be provided by us. Draw as many problems as possible in each sheet optimally but without cluttering and without compromising on neatness.
- When you start, first clean the drawing board and fix the mini-drafter. Then, fix the drawing sheet using cello-tape at such a location as to permit the access of the L-shaped scale of the mini-drafter all over the drawing sheet. You shall use only 3M's Magic tape that comes along with the dispenser. Then, draw the borders as per the specified margins using the L-shaped scale of the mini-drafter and not using an external scale or set-squares. You may have to adjust the orientation of the scale a few times in order to bring the scale parallel to the edges of the drawing sheet.
- The students shall bring the following to the Drawing Hall:
 - "Sheet00: Instructions" either as hard copy.
 - Hardcopy of the corresponding problem sheet downloaded from moodle. Referring to the softcopies of the problem sheet or the solutions in the mobile devices is forbidden.
 - The text book. Bringing the hardcopy of the lecture slides is optional.
 - Sketch book containing the rough solution of the problems to be practiced in the class.
 - Drawing instruments including the mini-drafter (see more detailed listing later!).
- The concerned instructor and the RAs/TAs will guide the students. They are also allowed to consult the text book, their sketch book and discuss with their friends. However, they shall not verbatim reproduce from the sheets of neighbours nor shall they consult the snapshots of the sheets of the previous batches. It has been noticed that students of previous batches shoot their sheets using their mobile phones and pass on to their friends; these beneficiaries simply reproduce these from their mobiles phones. This kind of usage of mobile phones is unfair and such mobile phones (along with the sim card) or any other displays including laptops shall be forfeited; these shall be returned only after the end semester examination of this course. Using photocopies of the previous batch sheets is also unfair.
- The sheet will be completed in the same session and submitted.
- The sheet will be graded and returned the following week.
- Any queries in corrections shall be described in an A4 sheet neatly and legibly and stapled to the answer sheets and resubmitted for review. This can be done either in the following lecture class or practice class.

- Each sheet will carry equal weightage. The total weightage for the sheets is 70%. There will be two tests, one for the first five sheets done manually and the other for the last five sheets done using AutoCAD, each carrying 10% weightage. SolidWorks and 3D Printing assignment will carry 10%.
- 80% attendance in both lectures and laboratory sessions is compulsory.
- Students are encouraged to makeup immediately if they happen to miss a sheet in the Drawing Hall. If a student misses a session for any reason, they should avail makeup session with prior appointment. The makeup session may be any of the following:
 - Drawing sessions of any other batch. However, this will be permitted only if the student shows proof that he is not bunking another class for this.
 - When a batch misses a class of a week due to a holiday, it will be normally compensated in the forenoon of the following Saturday. These compensation classes are already given in the 'Schedule' section of this document. This too can be availed to clear the backlogs.
 - In addition, we shall periodically declare compensation sessions in the weekends depending on the availability of manpower. So, keep track of these announcements in Moodle.
 - Note: No girl student will be allowed to work alone in the Drawing Hall.
- Irrespective of the reason, the makeup sheet will be graded without any penalty. However, attendance will be counted only if the absence is for one of the following valid reasons:
 - Medical reasons certified by IIT Hospital (“pink slip”).
 - Co-/extra-curricular reasons certified by the appropriate Dean.

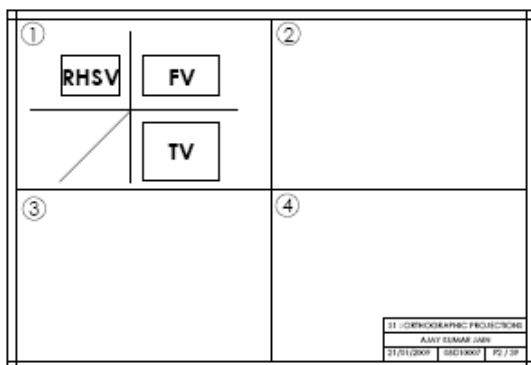
Procedure in the Drawing Hall

- The students are advised to come prepared so that the sheets can be completed within the given time.
- No electronic gadgets except the calculator is allowed. You shall keep the mobile phone and other electronic devices in your bag and leave the bag at the entry point. Only the text book, sketch book and drawing instruments shall be taken to the working area.
- The term “drawing instruments” refers to the following and more:

- Mini-drafter	- Small compass	- Eraser
- Scale	- Large divider	- Adhesive tape (3M Magic)
- Set-squares (45°, 30°-60°)	- Small divider	- Scissors (mandatory for Sheet 11 only)
- Protractor	- Two 0.5mm Staedler pencils each with HB and 2B leads	- Pen
- French curves		- Scientific Calculator
- Large compass		

*Note: 1. Paper cutters and blades are forbidden as students injure themselves often.
2. Adhesive tape without dispenser is not allowed.*

- The students can occupy any table of their choice.
- A3 (420 x 297) drawing sheet shall be used.
- You are not allowed to bring your own drawing sheet. We shall provide. The drawing sheets need not be stamped.
- The first five chapters of Reference 1 give preamble details on drawing instruments, sheet layout, lines, lettering, dimensioning etc. These shall be followed in all sheets.
- The drawing sheet shall be fixed on the drawing board using cello tape on all four corners. When you remove the sheet from the board, make sure that the entire tape is peeled off. Small cello tape dispensers are available. Cleanliness of the drawing board is your responsibility.
- Use 0.5mm collet pencil and not the conventional pencil. Bring adequate number of leads of required types. HB grade of lead is recommended for construction lines and 2B for body lines and axes. Bring at least 2 such pencils (one for each 2B and HB). Also bring one more for use with the compass.
- Wherever not specified, the drawings may be scaled appropriately. Plan the layout of each page so as to optimally and nicely accommodate the problems. Both sides of the drawing sheets may be used; more than one sheet is also permitted in which case they shall be stapled before submission.
- Draw a 10mm margin on all sides of the drawing sheet.
- Draw a 150mm X 45mm rectangle in the bottom right hand corner of the drawing sheet and divide it into three rows. The top row should contain the sheet number and name. The middle row should contain your name. The bottom row should contain the date and your roll number.
- The contents of this box should be written with ink (pen). Everything else in the drawing sheet should be written or drawn with pencil. A typical sheet may look like the following:



S1 : ORTHOGRAPHIC PROJECTIONS		
AJAY KUMAR JAIN		
21/01/2009	08D10007	P2 / 39

- Before starting any drawing on the sheet, draw the borders (and name plate on the first page). Please do not postpone to the end. This leads to poor quality.

- First fix the sheet on the drawing board using cello tape and then draw borders using the mini-drafter.
- Do not scribble the letters in the name plate. Letters in the name plate shall be of 5mm height.
- Complete the dimensioning and lettering for each problem as soon as it is completed. Please do not postpone it to the end. This leads to poor quality.
- Letters shall be written within a pair of parallel lines of appropriate spacing.
- Lettering, dimensioning, line types etc. shall be as per the standards discussed in Chapters 1-5.
- Only first page need to have the name plate as specified above. All other pages shall have your roll number neatly written at the bottom right.
- Multiple sheets shall be stapled.