

**COURSE STRUCTURE**  
**CLASS XII (2022-23)**

**One Paper (Theory): 3 Hours**

**70 Marks**

**One paper (Practical): 3 Hours**

**30 Marks**

Sr. No.	Unit Name	Marks	Periods
I	Isometric Projections of Solids	25	40
II	<b>Machine Drawing</b> A. Drawing of Machine parts B. Assembly Drawing and Dis-assembly drawings 1. Bearings 2. Rod joints 3. Tie-rod and Pipe joint	45	75
<b>Practical</b>		30	45
<b>Total Marks</b>		<b>100</b>	<b>160</b>

**THEORY**

**Unit I: Isometric Projection of Solids**

**40 Periods**

- (i) Construction of isometric scale showing main divisions of 10mm and smaller divisions of 1mm, also showing the leading angles. Drawing helping view/s such as triangles, pentagon, hexagon, etc., using isometric scale.
- (ii) Isometric projection (drawn to isometric scale) of solids such as cube; regular prisms and pyramids (triangular, square, pentagonal and hexagonal); cone; cylinder; sphere; hemisphere. The axis and the base side of the solid should be either perpendicular to HP / VP or parallel to HP and VP. (Indicate the direction of viewing).
- (iii) Combination of any two above mentioned solids keeping the base side parallel or perpendicular to HP/VP and placed centrally together (Axis of both the solids should not be given parallel to HP).

**Note:** Hidden lines are not required in isometric projection.

**Unit II: Machine Drawing (as per SP46: 2003)**

**75 Periods**

**A. Drawing of machine parts**

- (i) Drawing to full size scale with instruments. 25 Periods

(Internal choice will be given between any two of the following).

Introduction of threads: Standard profiles of screw threads - Square, Knuckle, B.S.W., Metric (external and internal); Bolts – Square head, Hexagonal head; Nuts – Square head, Hexagonal head; Plain washer;

combination of nut and bolt with or without washer for assembling two parts together.

(ii) Free-hand sketches

(Internal choice will be given between any two of the following).

Conventional representation of external and internal threads; Types of studs – Plain stud, Square-neck stud, Collar stud; Types of rivets – Snap head, Pan head (without tapered neck), Flat head, 60° countersunk flat head.

**B. Assembly drawings and Dis-Assembly drawings**

(Internal choice will be given between an Assembly drawing and a Dis-Assembly drawing). 50 periods

1. Bearings
  - (i) Open-Bearing
  - (ii) Bush- Bearing
2. Rod-Joints
  - (i) Cotter-joints for round-rods (Sleeve and cotter joint)
  - (ii) Cotter-joints for square rods (Gib and cotter-joint)
3. Tie-rod and Pipe-joint
  - (i) Turnbuckle
  - (ii) Flange pipe joint

**Note:**

1. *In all Assembly drawings, half sectional front view will be asked. Side/End view or Top View/Plan will be drawn without section.*
2. *In all Dis-assembly drawings, only two orthographic views (one of the two views may be half in section or full in section) will be asked of any two parts only.*
3. *(a) In all sectional views, hidden lines/ edges are not to be shown.  
(b) In all full views, hidden/edges are to be shown.*

**PRACTICALS**

**45 Periods**

(i) To perform the following tasks (for One only) from the given views of the prescribed ten machine blocks in **ANNEXURE-I**.

Value-Points

- |  |   |
|--|---|
| 1. Copy the given views  | 1 |
| 2. Drawing the missing view with hidden lines  | 2 |
| 3. Sketching the Isometric view without hidden edges   | 5 |
| 4. To make the machine block of the above in three dimensions.<br>(Not to scale but approximately proportionately drawn with |   |

	Any medium i.e. thermocol, soap-cake, plasticine, clay, wax, orchsis (available with florists), etc.	7
(ii)	Computer Aided Design (CAD) – Project Project file to be submitted on the simple solids (Prism, Pyramids and Frustums of equilateral triangle, square, pentagon and hexagon) or machine blocks as prescribed in part-I by using the CAD software.	10
(iii)	(a) Sessional work relating to machine blocks as prescribed.	3
	(b) Viva-voce based on part-I and part-II	2
	<b>Total Marks</b>	<b>30</b>

### ACTIVITY

Industrial Visits (Two) to any industry/ manufacturing plant to acquaint the students with the present - day methods & technology for better conceptual understanding can be done by virtual tour of the factory/plant. The following links are given as an example for same:

Bolt Making Machine Manufacturer

<https://www.youtube.com/watch?v=ARS87trb4u4>

Machine Tools Manufacturing Process -2

<https://www.youtube.com/watch?v=vIzjTEkGbN8>

BMW Engine Factory

[https://www.youtube.com/watch?v=Oz6E\\_1KonbA](https://www.youtube.com/watch?v=Oz6E_1KonbA)

Hydroelectric Virtual Plant Tour

<https://youtu.be/Ki8kSB1ThJQ>

## ANNEXURE -- 1



