

ENGINEERING GRAPHICS (Code No. 046)
COURSE STRUCTURE
CLASS XII (2022-23)

THEORY

Unit I: Isometric Projection of Solids

- (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)

A. Drawing of machine parts

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

(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.

NOTE: Completion of the Mid-Term syllabus by 30th September 2022.

MID-TERM EXAMINATION

THEORY

Unit I: Isometric Projection of Solids

- (iv) 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.
- (v) 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).
- (vi) 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)

A. Drawing of machine parts

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

(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, 60⁰ countersunk flat head.

B. Assembly drawings and Dis-Assembly drawings

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

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.*

One Paper (Theory): 3 Hours

70 Marks

One paper (Practical): 3 Hours

30 Marks

S.No.	Unit Name	Marks
I	Isometric Projections of Solids	25
II	Machine Drawing A. Drawing of Machine parts B. Assembly Drawing and Dis-assembly drawings <ol style="list-style-type: none"> 1. Bearings 2. Rod joints 3. Tie-rod and Pipe joint 	45
	Practical	30
	Total Marks	100

Note:

- **Complete the Annual syllabus by 15th December 2022.**
- **Whole syllabus (excluding deleted part) will be covered in Common Annual School Examinations.**

PRACTICALS

(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. (not to scale but approximately proportionately drawn with any medium i.e. thermocol, soap-cake, plasticine, clay, wax, orchis (available with florists), etc.	7
(ii) Computer Aided Design (CAD) – Project	10
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.	
(iii) (a) Sessional work relating to machine blocks as prescribed.	3
(b) Viva-voce based on part-I and part-II	2
Total Marks	30

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=0z6E_1KonbA

Hydroelectric Virtual Plant Tour

<https://youtu.be/Ki8kSB1ThJQ>

ANNEXURE -- 1



