

**CLASS–XII (2014-15)**  
**(Theory)**

One Paper: 3 Hours

70 Marks

S.No.	Unit	Periods	Marks
I.	Isometric Projections of Solids	50	25
II.	Machine Drawing	118	45
	A. Drawing of Machine parts		
	B. Assembly Drawing and Dis-assembly drawings		
	1. Bearings		
	2. Rod joints		
	3. Tie-rod and pipe joints		
	4. Couplings		
	5. Pulleys		
	<b>Practical</b>	72	30
	<b>Total Marks</b>	<b>240</b>	<b>100</b>

**Unit I: Isometric Projection of Solids****50 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 projections (drawn to isometric scale) of solids such as cube, regular prism and pyramids (triangular, square, pentagonal and hexagonal), cone, cylinder, sphere, hemi-sphere, frustum of right regular pyramids (triangular, square, pentagonal, hexagonal) and cone, when they are cut by a plane parallel to the base. 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 two solids (except "frustum" of Pyramids and Cone) 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:**
- (1) Question on frustum will be asked in vertical position only.
  - (2) Hidden lines are not required in isometric projection.

**Unit II: Machine Drawing (as per SP46: 2003)****118 Periods****A. Drawing of machine parts****36 Periods**

- (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, Hexagonal, Tee and Hook); Nuts: (Square and Hexagonal), Plain washer, combination of nut and bolt with or without washer for assembling two parts together, Single riveted lap joint with standard dimensions.

- (ii) Free-hand sketches

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

Conventional representation of external and internal threads; studs (plain, square-neck and collar), screws (round-head, cheese-head, 90° flat counter sunk-head, hexagonal sockethead and grub-screw). Types of rivets:- snap head, pan head-without tapered neck, flat head and 60° countersunk flat head. Types of sunk-keys (rectangular taper, woodruff and double-head feather key with gib head on both ends).

- B. Assembly drawings and Dis-Assembly drawings (Internal choice will be given between an Assembly drawing and a Dis-Assembly drawing). **82 Periods**

- 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 the Dis-assembly drawings (asterix \* marked only), only two orthographic views (one of the two views may be half in section or full in section) of any two parts.
  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.

1. Bearings

- \* (i) Open-Bearing
- \* (ii) Bushed-Bearing
- (iii) Footstep-Bearing (only sectional front-view will be asked)
- (iv) Simple Plummer-Block (only sectional front view will be asked with only round brasses).

2. Rod-Joints

- \* (i) Cotter-joints for circular-rods (socket and spigot joint)
- (ii) Cotter-joints for round-rods (sleeve and cotter joint)
- \* (iii) Cotter-joints for square rods (Gib and cotter-joint)
- (iv) Knuckle-joints (only sectional front view will be asked)

3. Tie-rod and Pipe-joint

- \* (i) Turnbuckle
- \* (ii) Flange pipe joint

4. Couplings

- (i) Unprotected Flange Coupling (having socket and spigot arrangement)
- \* (ii) Protected Flange Coupling

5. Pulleys

- (i) Solid cast Iron Pulley (upto 200 mm diameter) having solid web
- \* (ii) Single groove V-belt pulley (upto 200 mm diameter)

## PRACTICALS

One paper (Practical): 3 Hours

30 Marks 72 Periods

(I) To perform the following tasks from the given views of the prescribed Machine

Block (One).

Value-Points

- |    |                                                                                                                                                                                                                                     |   |
|----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---|
| 1. | Copy the given views                                                                                                                                                                                                                | 1 |
| 2. | Drawing the missing view without 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 flowerists), 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) (i) Sessional work relating to machine blocks as prescribed. 3

(ii) Viva-voce based on part-I and part-II 2

**Total Marks 30**



