GE3251 ENGINEERING GRAPHICS

COURSE MATERIAL

UNIT - V
PERSPECTIVE PROJECTION OF SIMPLE SOLIDS

Definitions

1. Perspective Projection is the graphic representation of an object on a single plane called Picture Plane (PP), as it appears to an observer.

2. The object is placed behind the PP.
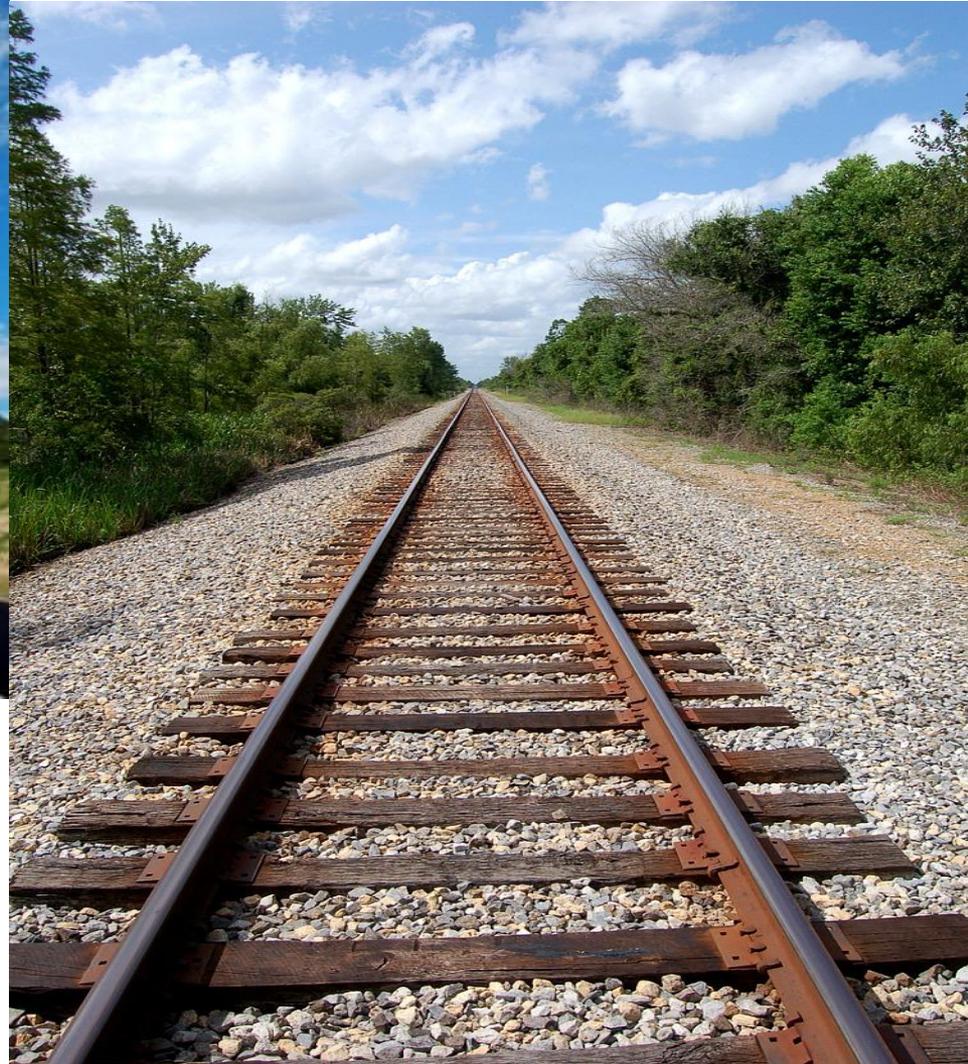
3. The observer is stationed in front of PP.

Definitions

4. Therefore, visual rays from the eyes of the observer to the object are cut by the PP, i.e., the rays pierce the picture plane and form an image on it.

5. This image is the perspective view of the object.

Definitions

1. The arrangement of the eye, picture plane and the object is the same as in the case of ***Third Angle Projection.***

2. Therefore, the top view of the object is drawn above the front view.
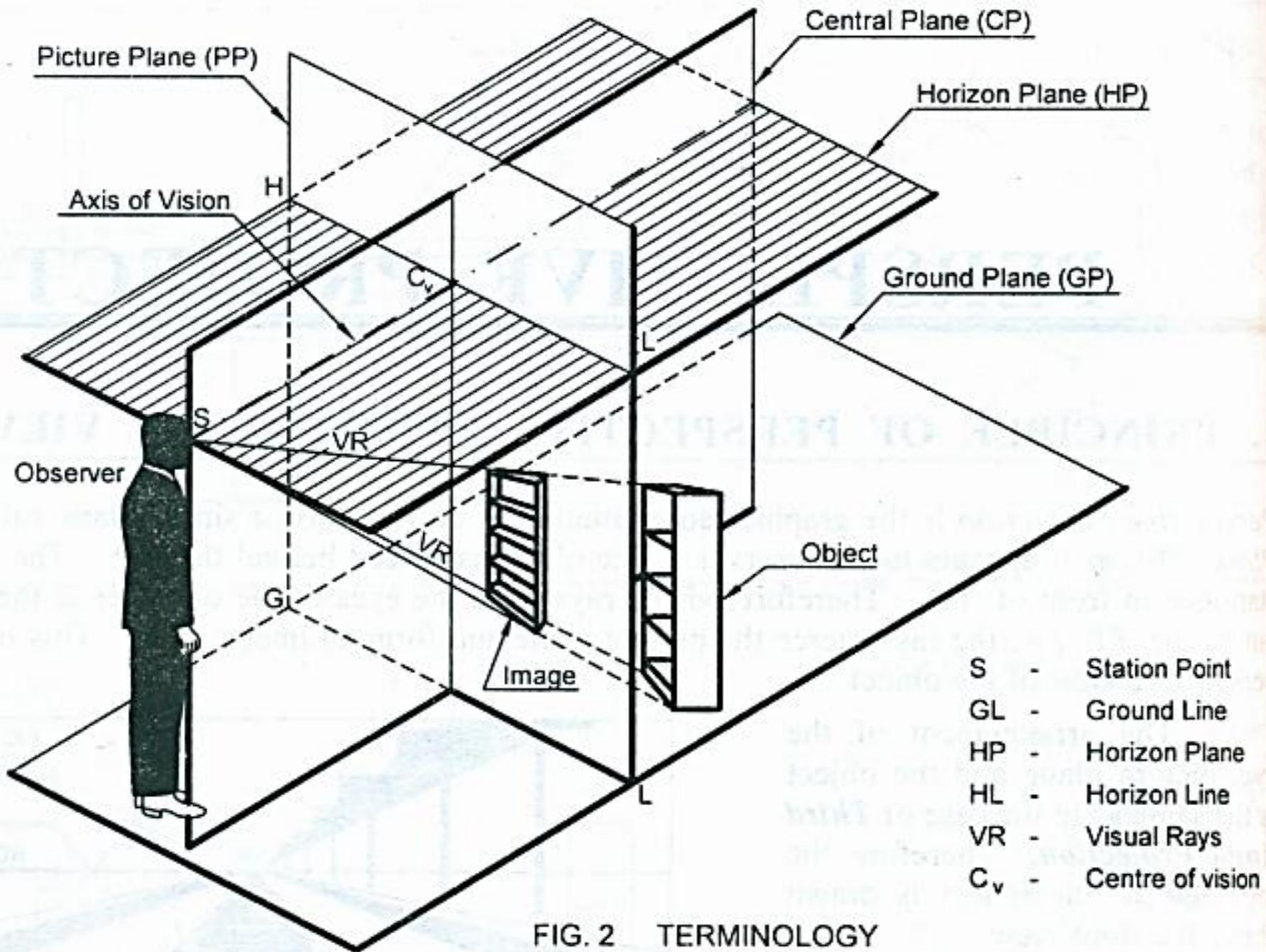
Examples of Perspective projection

FIG. 2   TERMINOLOGY

Picture Plane (PP)

Axis of Vision

Observer

Central Plane (CP)

Horizon Plane (HP)

Ground Plane (GP)

Object

Image

H

C_v

L

S

VR

VR

G

L

S   —   Station Point

GL —   Ground Line

HP —   Horizon Plane

HL —   Horizon Line

VR —   Visual Rays

C_v —   Centre of vision
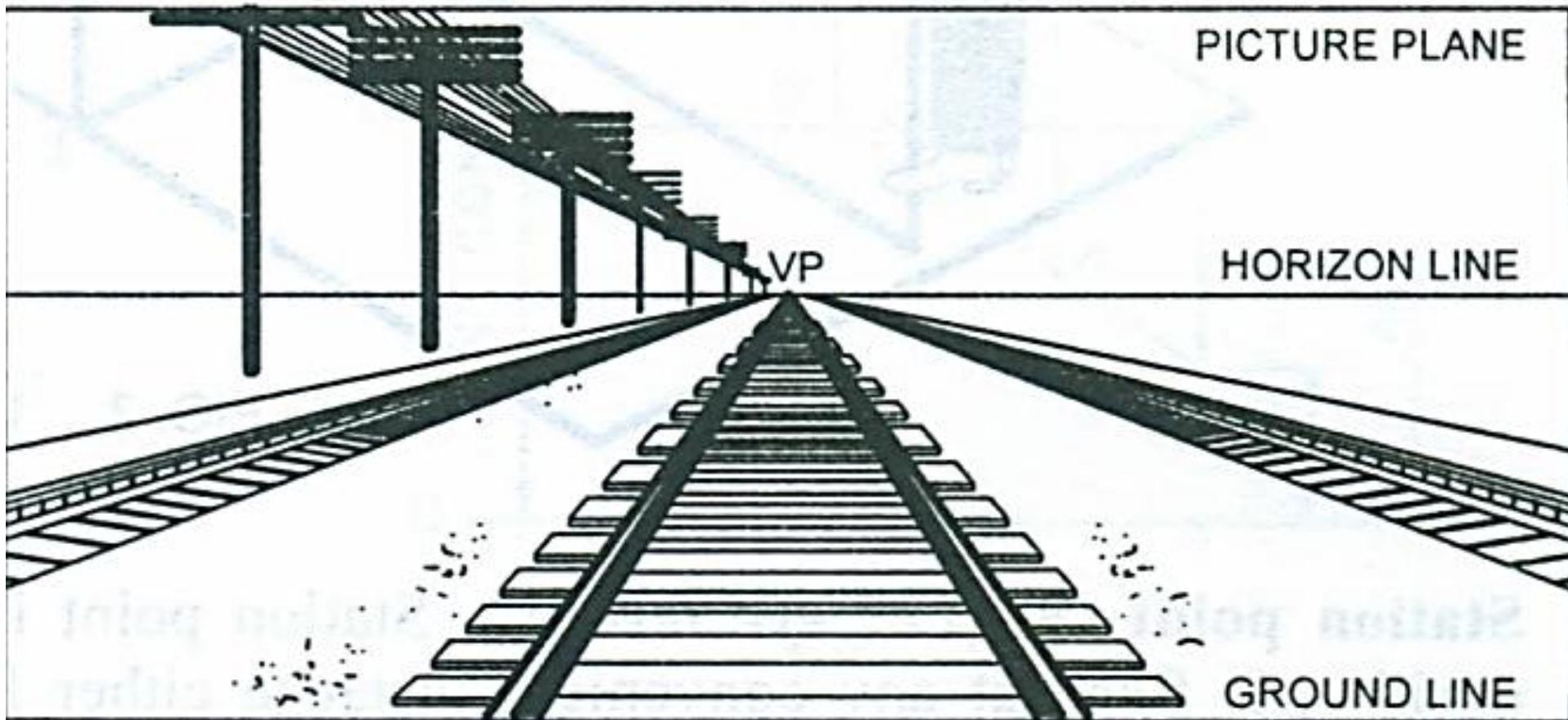
Perspective projection of rail track

Terminology

Ground Plane (GP):

Ground Plane is a horizontal plane representing ground on which the object is assumed to be placed.

Picture Plane (PP):

It is a vertical transparent plane on which the perspective view of the object is projected. It is placed in between the object and observer. The front view of the perspective elements and of the object (if necessary) may also be projected on the PP.

Terminology

Horizon Plane / Horizontal Plane (HP):

It is an imaginary horizontal plane at the level of the observer's eye or S. It is above and parallel to the GP and perpendicular to the PP.

Station point (S) (i.e., eye level):

Station point is the position of the observer's eye. Its position is fixed at any convenient distance either from the picture plane or from the object. Shape and visibility of edges of perspective projection depends upon the position of S.

Terminology

Ground Line (CL):

It is the line of intersection of the GP with the PP.

Horizon Line (HL):

It is the line of intersection of HP with PP. It is parallel to GL.

Axis of Vision (AV) / Perpendicular Axis (PA) / Line of Sight:

It is a line drawn perpendicular to the PP from S.

Terminology

Center of vision (C):

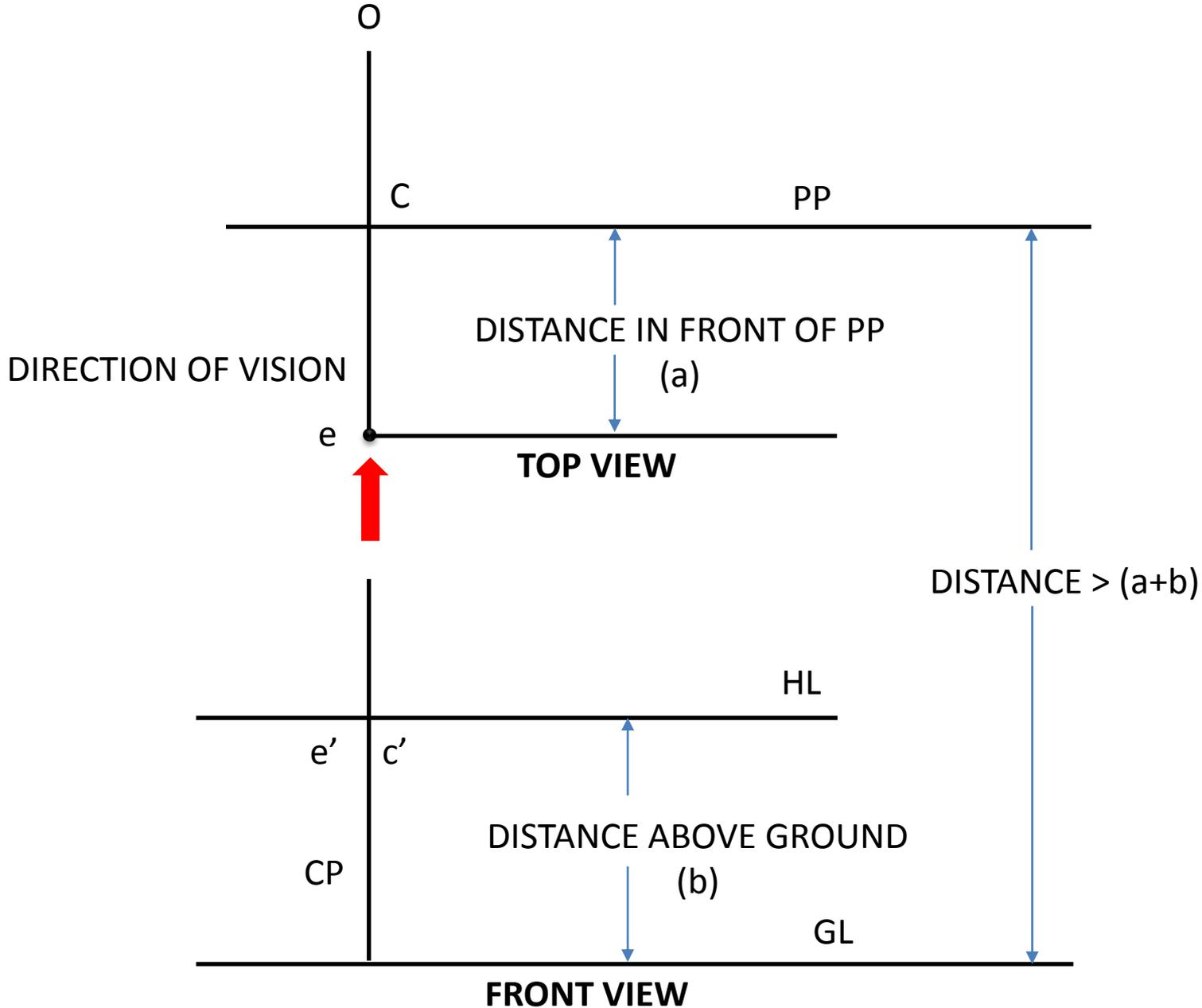It is the point at which the axis of vision pierces the PP. It is also the point of intersection of HL with AV.

Central Plane (CP):

It is an imaginary vertical plane which passes through the S and C. It is perpendicular to both the PP and the GP. It contains the Axis of Vision (Ay).

Vanishing Point (VP):

All the projections converge to a point known as Vanishing Point.

Orthographic projections of Perspective Elements

O

C   PP

DISTANCE IN FRONT OF PP
(a)

DIRECTION OF VISION

e

TOP VIEW

DISTANCE > (a+b)

HL

e'   c'

CP

DISTANCE ABOVE GROUND
(b)

GL

FRONT VIEW

Methods of Drawing Perspective

1. **Projection method or visual ray method**
2. Vanishing point method
3. Direct method

Projection method or visual ray method

In the visual ray method, the perspective view is drawn by using either the **top and front views** or the **top view and the end view** of the visual rays.
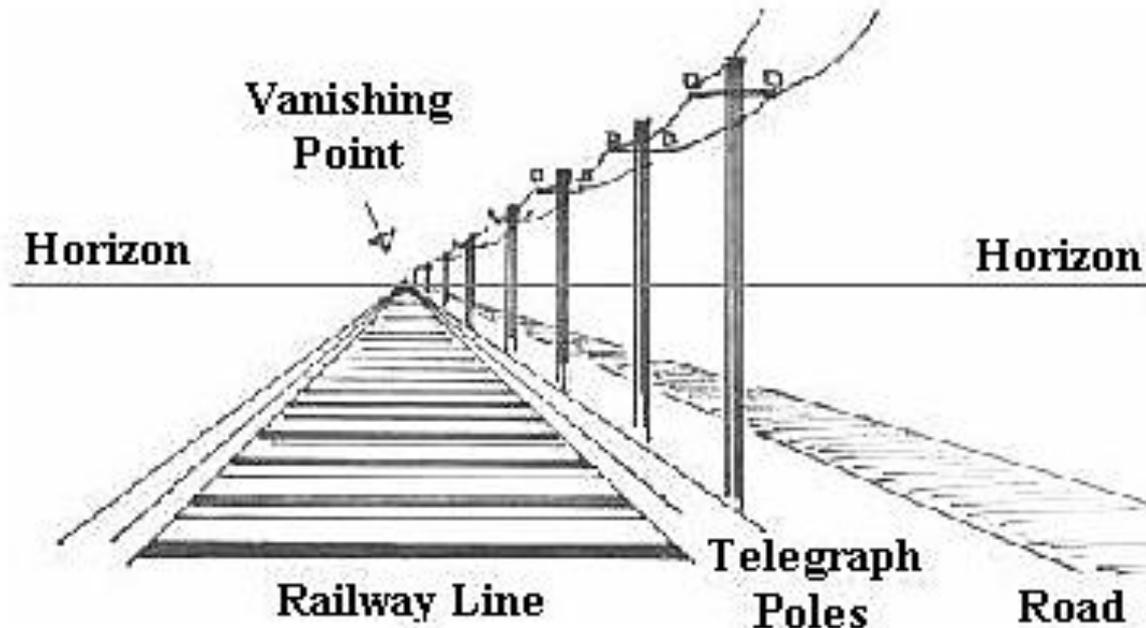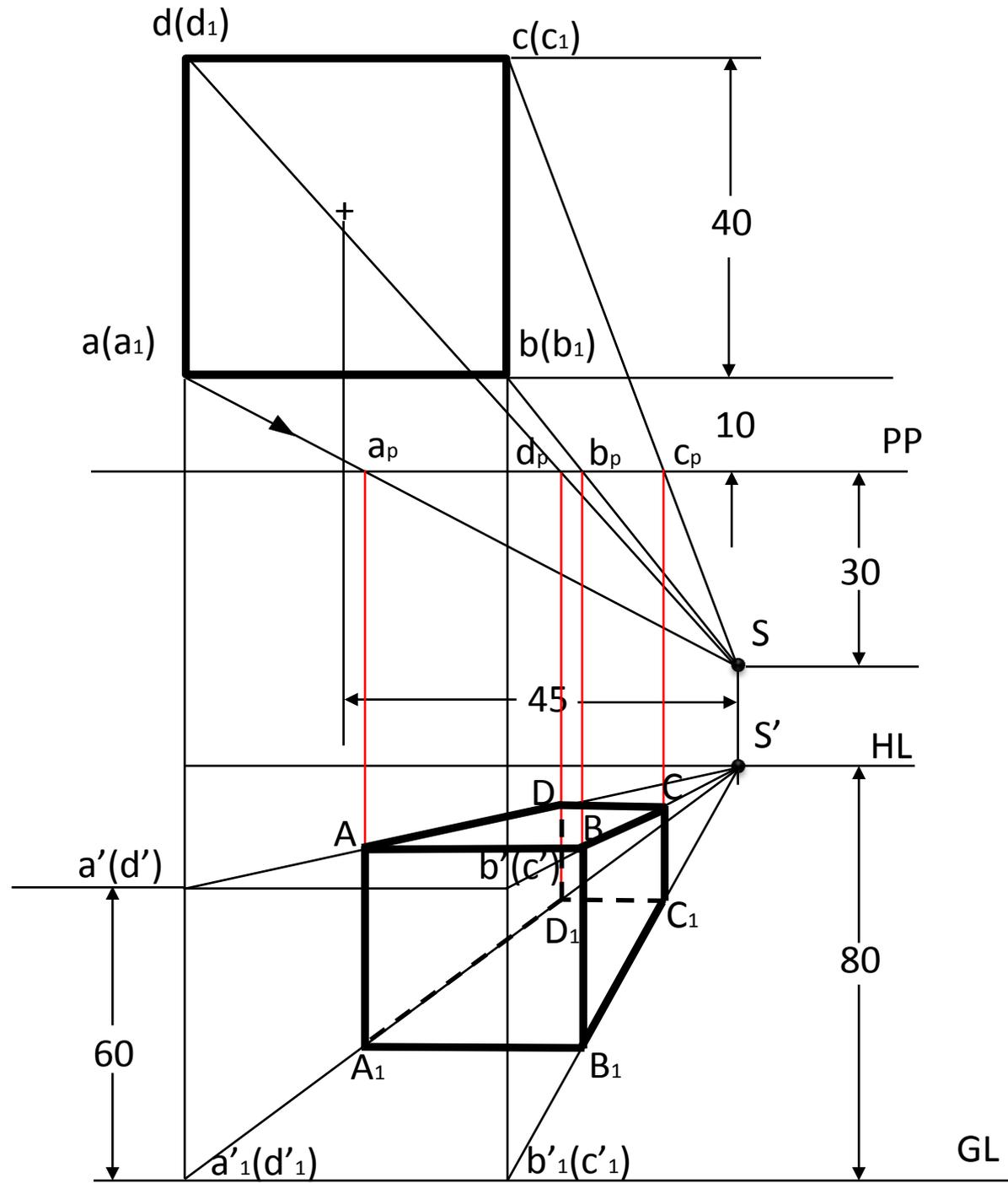
Problem 1

A square prism, side of base 40 mm and height 60 mm rests with its base on the ground such that one of its rectangular faces is parallel to and 10 mm behind the picture plane. The station point is 30 mm in front of PP, 80 mm above the ground plane and lies in a central plane 45 mm to the right of the center of the prism. Draw the perspective projection of the square prism.

Problem 1

Draw GL and project the
front view of the prism.
Height 60 mm

$d(d_1)$　　　　　　　$c(c_1)$

40

$a(a_1)$　　　　　　$b(b_1)$

10　　PP

a_p　　　d_p　b_p　c_p

30

S

45

S'　　HL

D　　　C

A　　　B

$a'(d')$　　$b'(c')$

D_1　　C_1

80

60

A_1　　　B_1

$a'_1(d'_1)$　　$b'_1(c'_1)$　　GL

Problem 2

A square prism of base 25 X 25 mm and height 40 mm rests on the GP on one of its ends with a rectangular face receding away from the PP towards right making 60° with PP. The corner nearest to the PP is 40 mm to the left of the station point and 20 mm behind the PP. The station point is 60 mm above the GP and 50 mm in front of the PP. Draw the perspective view of the prism by visual ray method. Use the top view and the front view. Page no 432
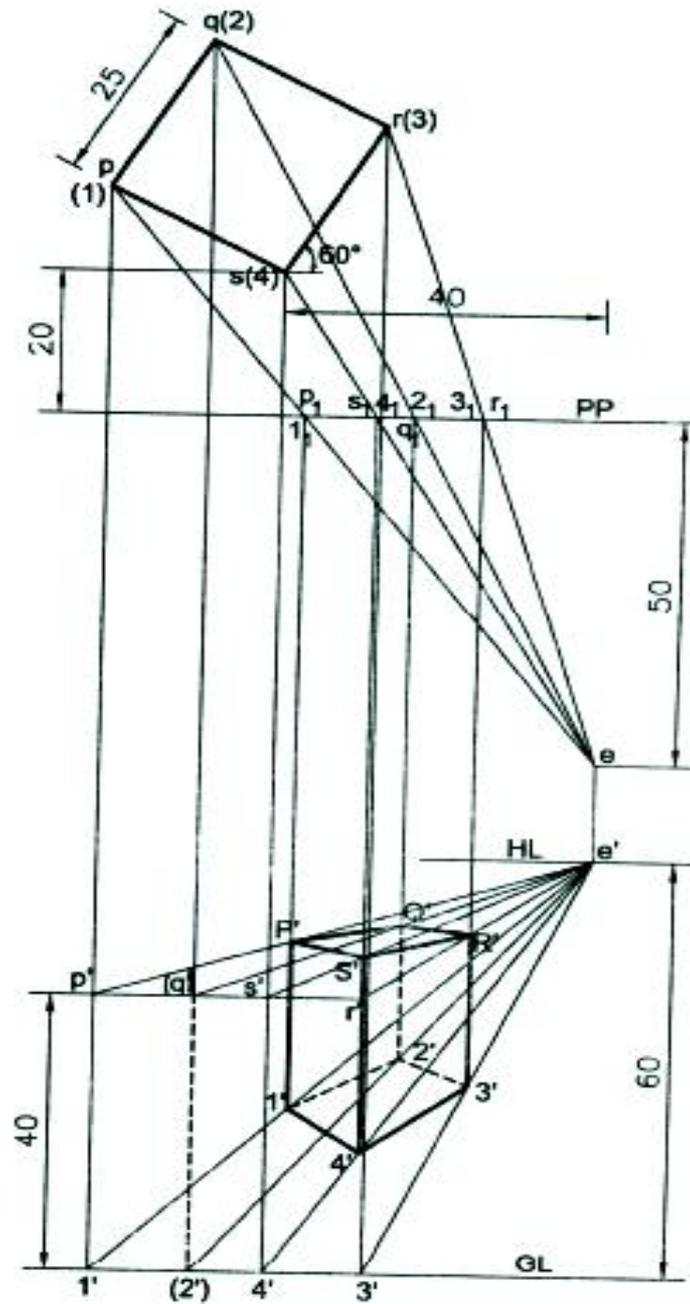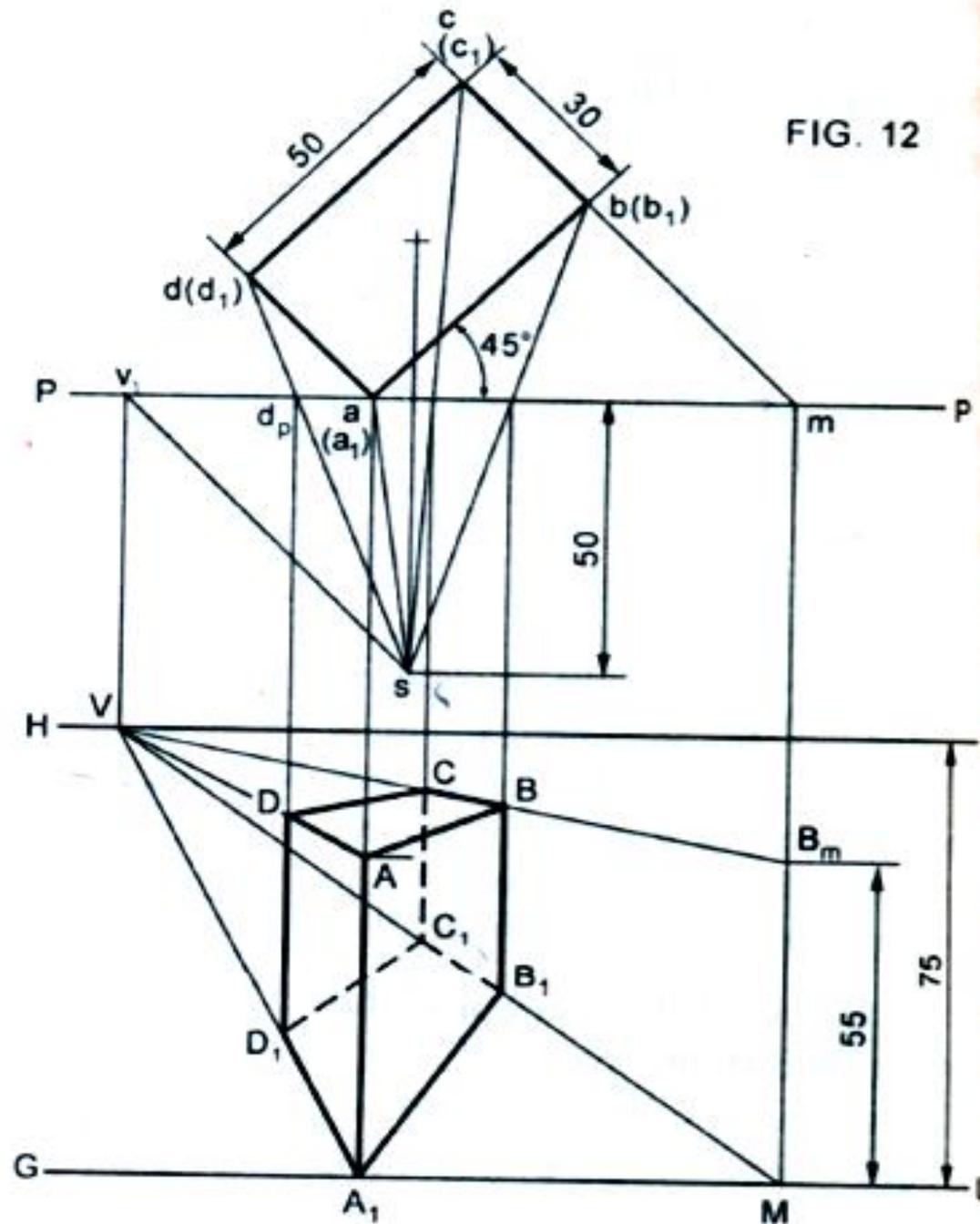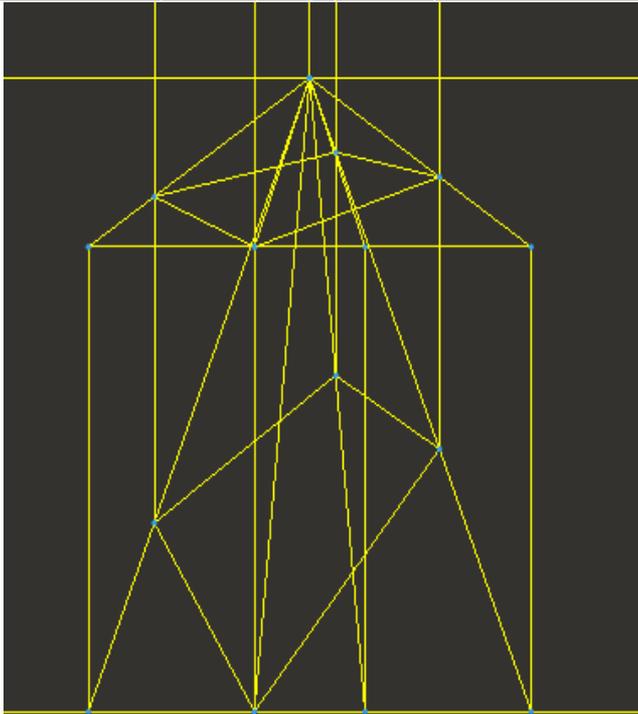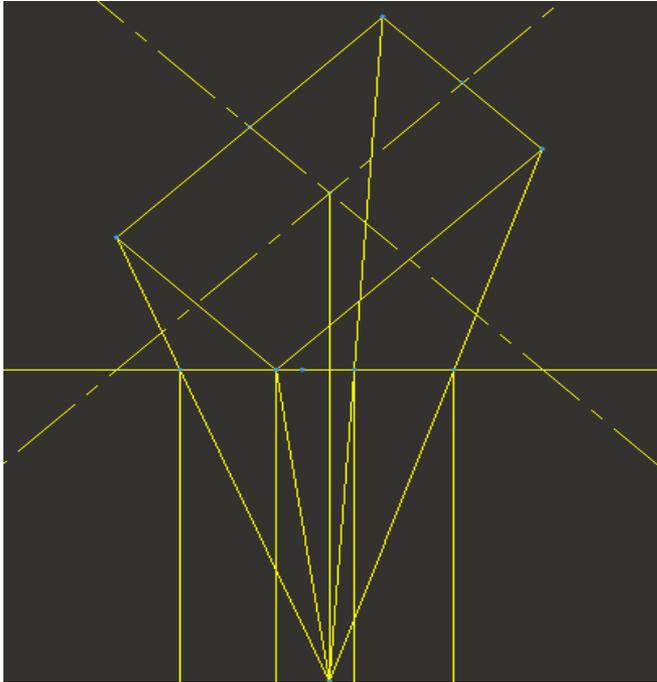
Problem 2

Fig.C

Problem 3

A rectangular prism sides of base 50 mm X 30 mm and height 55 mm rests with its base on the ground plane. A vertical edge is in the picture plane and one of the longer edges of its base is inclined at 45° to PP and behind it. The station point is 50 mm in front of PP, 75 mm above the ground plane and lies in a central plane which passes through the center of the prism. Draw the perspective projection of the solid. Page no 24.12

Problem 3

FIG. 12
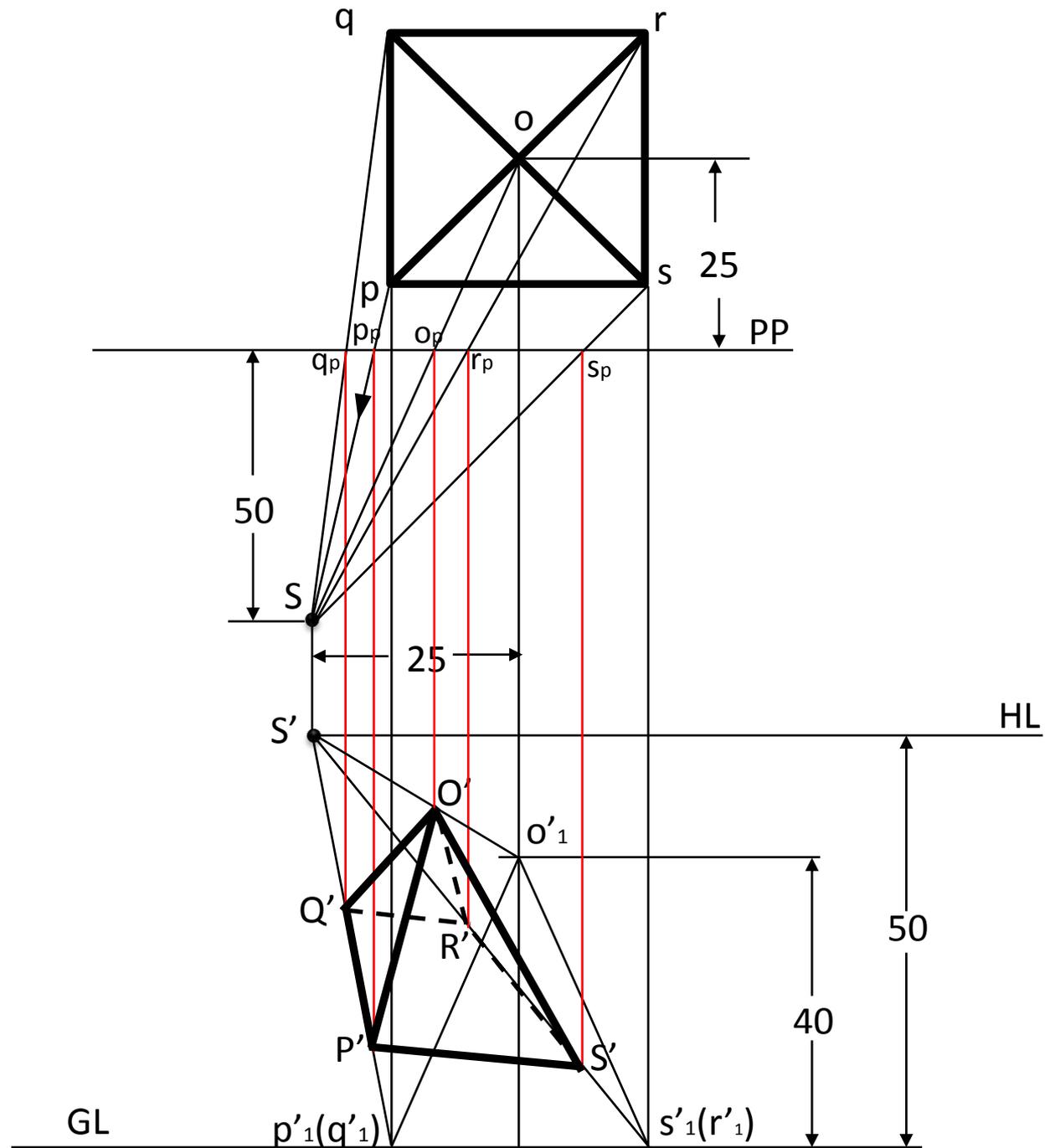
Problem 4

A rectangular lamina of size 30 mm x 50 mm rests on the ground with one edge on PP and the remaining portion behind PP. The station point is 60 mm above GP and 30 mm in front of PP and lies on a central plane 35 mm to the left of the nearest edge of the lamina. Draw the perspective view of the lamina. Univ qustn jan 13

Problem 5

A square pyramid of base edge 20 mm and altitude 40 mm rests on its base on the ground with a base edge parallel to the picture plane. The axis of the pyramid is 25 mm behind the PP and 25 mm to the right of the eye. The eye is 50 mm in front of the PP and 50 mm above the ground. Draw its perspective view. Page no 446
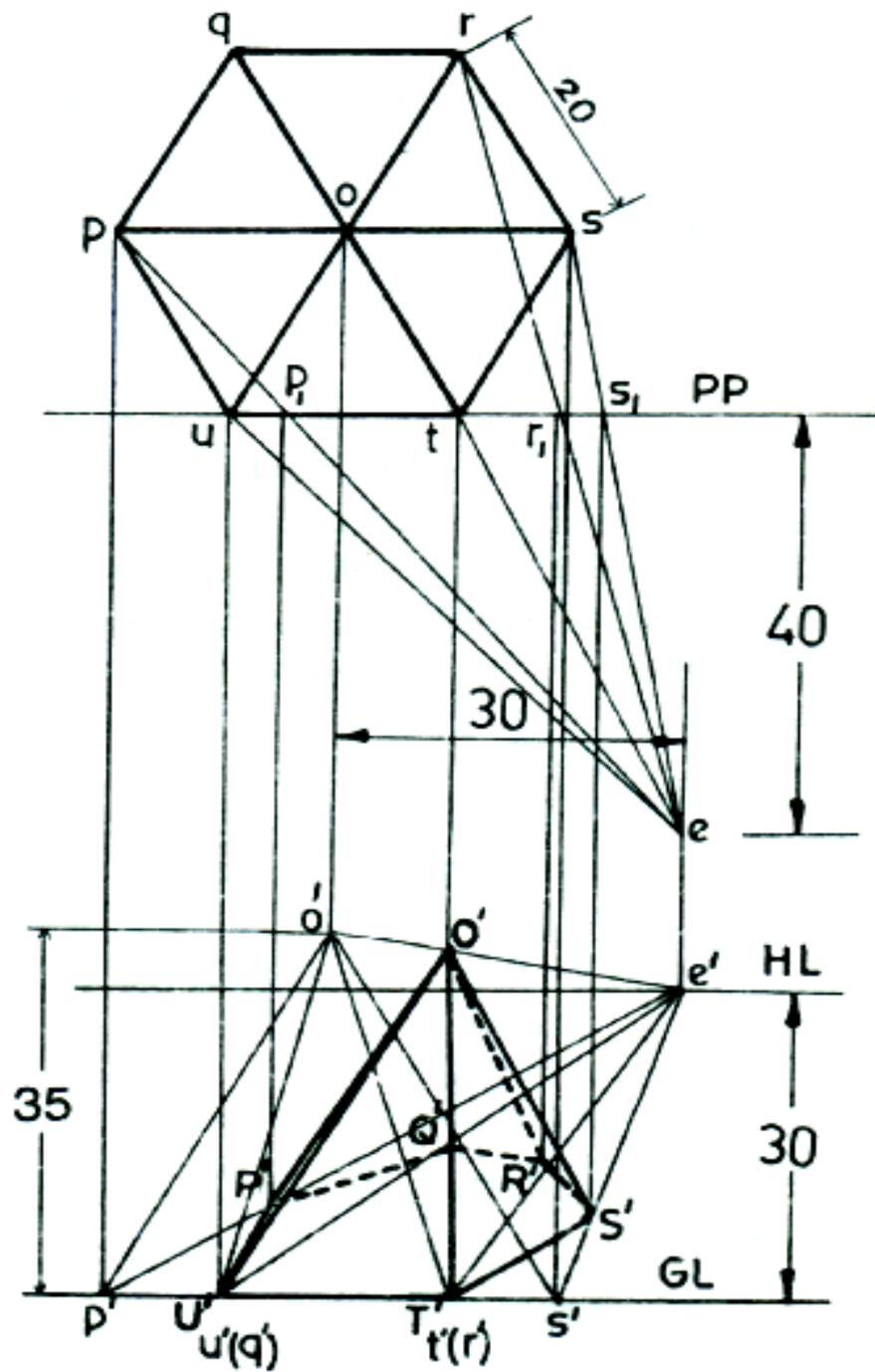
Problem 5

q
r
o
s
25
p
pₚ
oₚ
PP
qₚ
rₚ
sₚ
50
S
25
S'
HL
O'
o'₁
Q'
50
R'
40
P'
S'
GL
p'₁(q'₁)
s'₁(r'₁)

Problem 6

A regular hexagonal pyramid of base edge 20 mm and height 35 mm rests on its base on the ground plane with one of its base edges touching the picture plane. The station point is 30 mm above the ground plane and 40 mm in front of the PP. The central plane is 30 mm to the right of the axis. Draw the perspective projection of the pyramid by visual ray method. Use top view and the front view. Page no 429

Problem 6
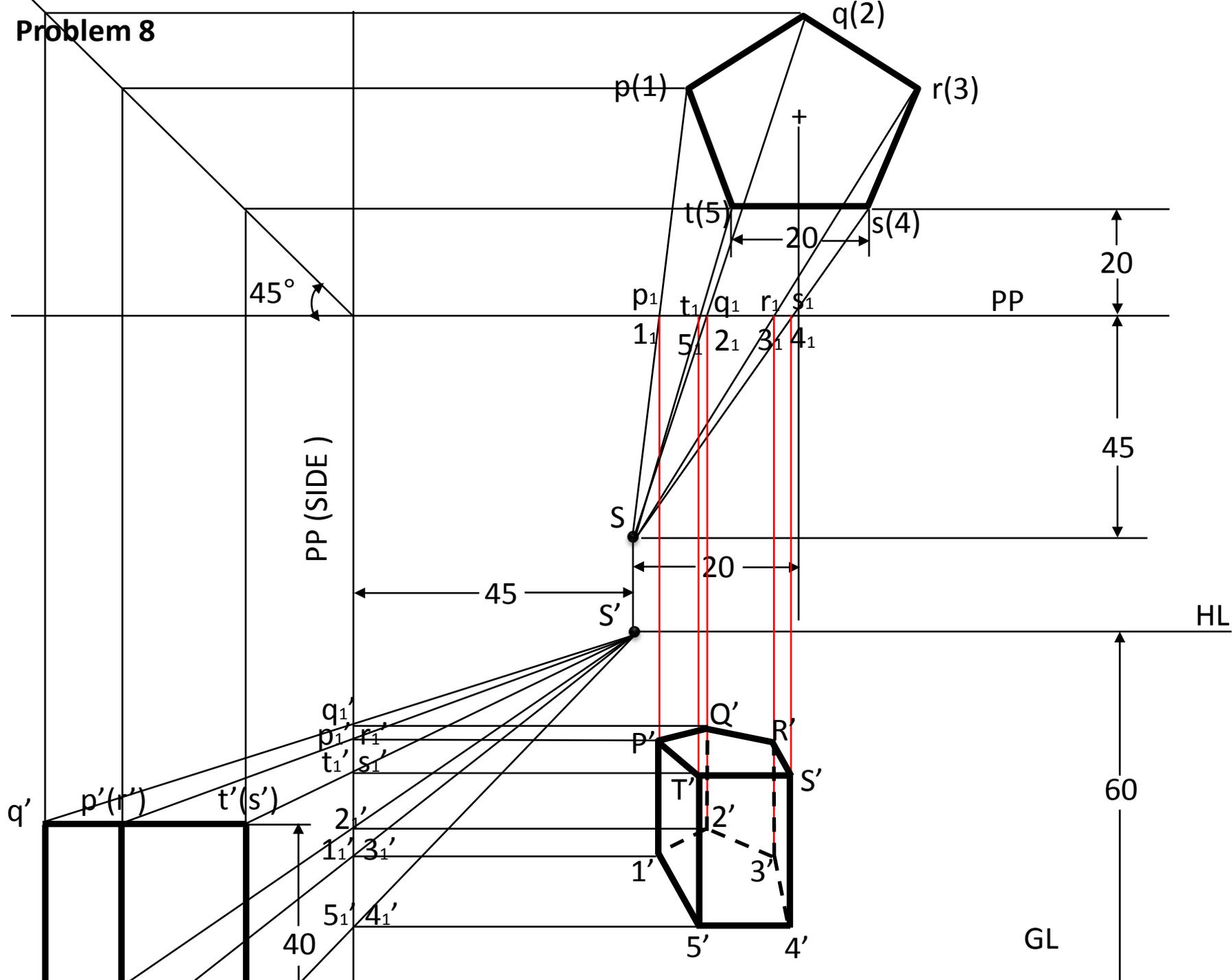
Problem 7

A rectangular pyramid, base 30 mm X 20 mm and axis 35 mm long, is placed on the ground plane on its base, with the longer edge of the base parallel to and 30 mm behind the picture plane. The central plane is 30 mm to the left of the apex and station point is 50 mm in front of the picture plane and 25 mm above the ground plane. Draw the perspective view of the pyramid. Jan 12

Problem 8

Draw the perspective view of a pentagonal prism of base side 20 mm and height 40 mm when it rests on its base on the ground plane with one of its rectangular faces parallel to and 20 mm behind the picture plane. The station point is 45 mm in front of the PP and 60 mm above the GP. The observer is 20 mm to the left of the axis. Use the top view and the end view to draw the perspective by visual ray method. Page no 430

Problem 8

45°

p(1)

q(2)

r(3)

t(5)   s(4)

20

20

PP (SIDE)

p_1 t_1 q_1 r_1 s_1 PP

1_1 5_1 2_1 3_1 4_1

20

45

S

20

45

S'

HL

q_1'

p_1' r_1'

t_1' s_1'

q'

p'(r')   t'(s')

$2'$

$1_1'$ $3_1'$

$5_1'$ $4_1'$

40

Q'   R'

P'

T'   S'

2'

1'   3'

5'   4'

60

GL
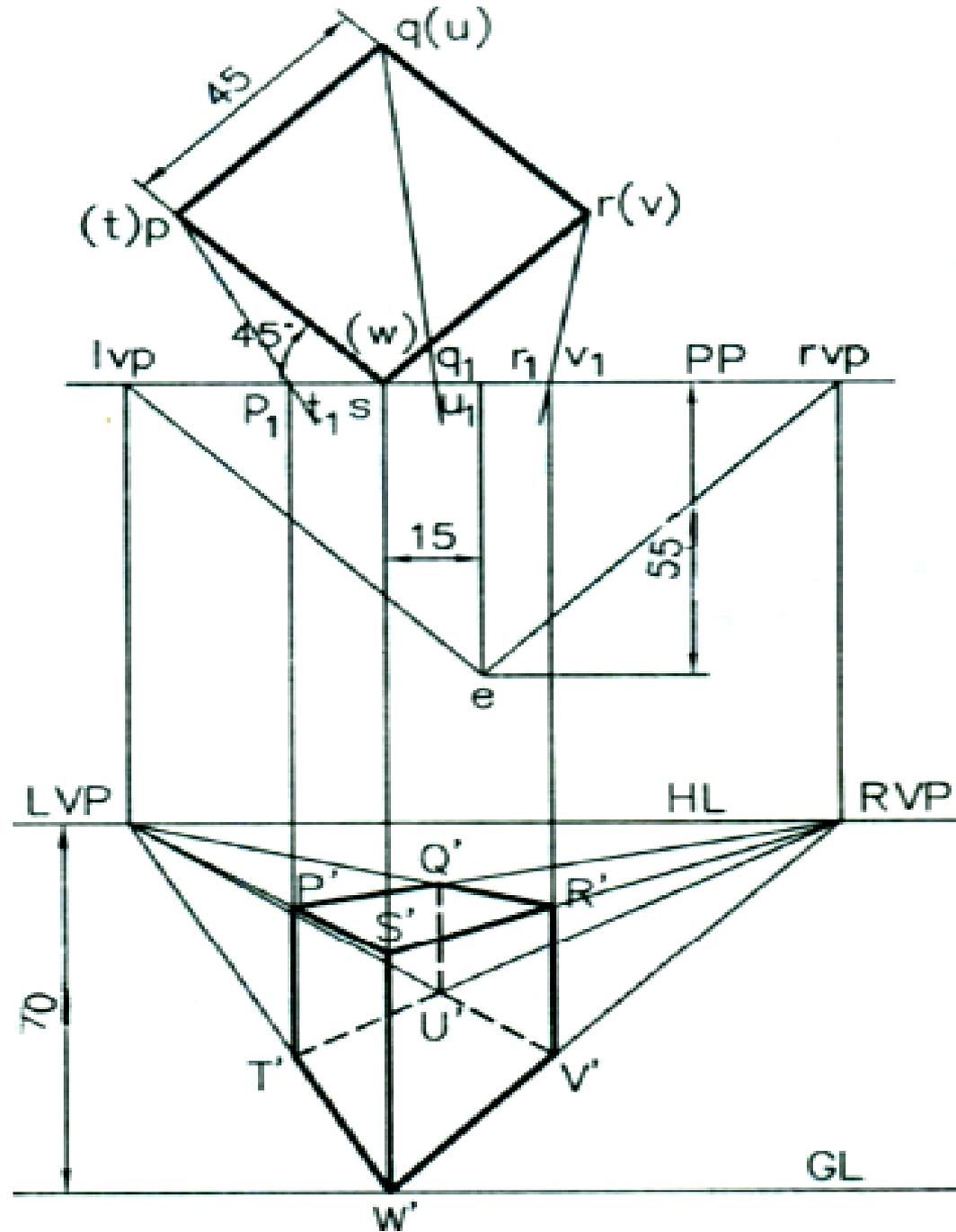
Problem 9

A cube of side 45 mm rests on the ground on its base with all the vertical faces equally inclined to picture plane. One vertical edge is touching the picture plane and is 15 mm to the left of the station point which is 70 mm above ground and 55 mm in front of the picture plane. Draw the perspective of the cube. Page no 459
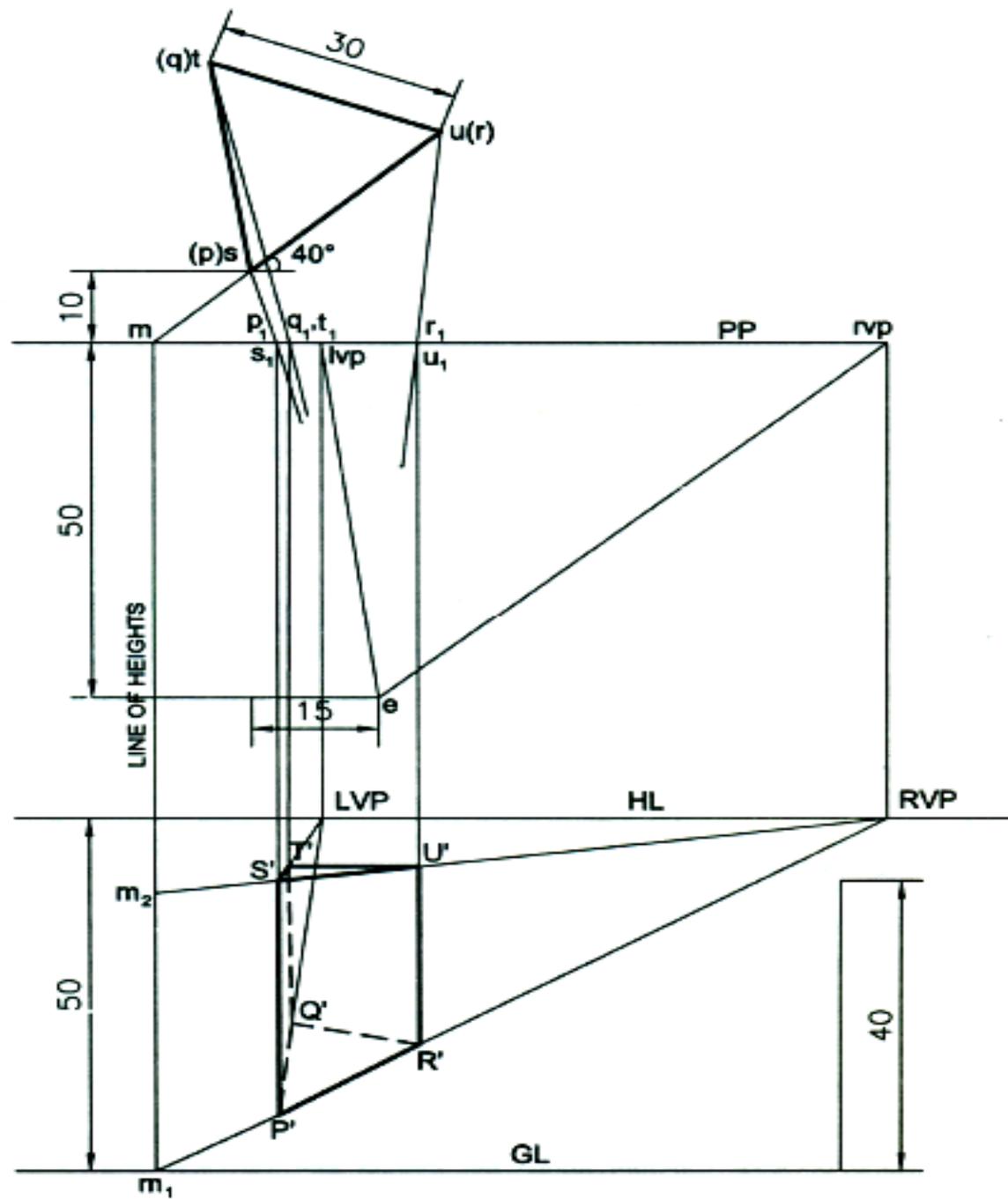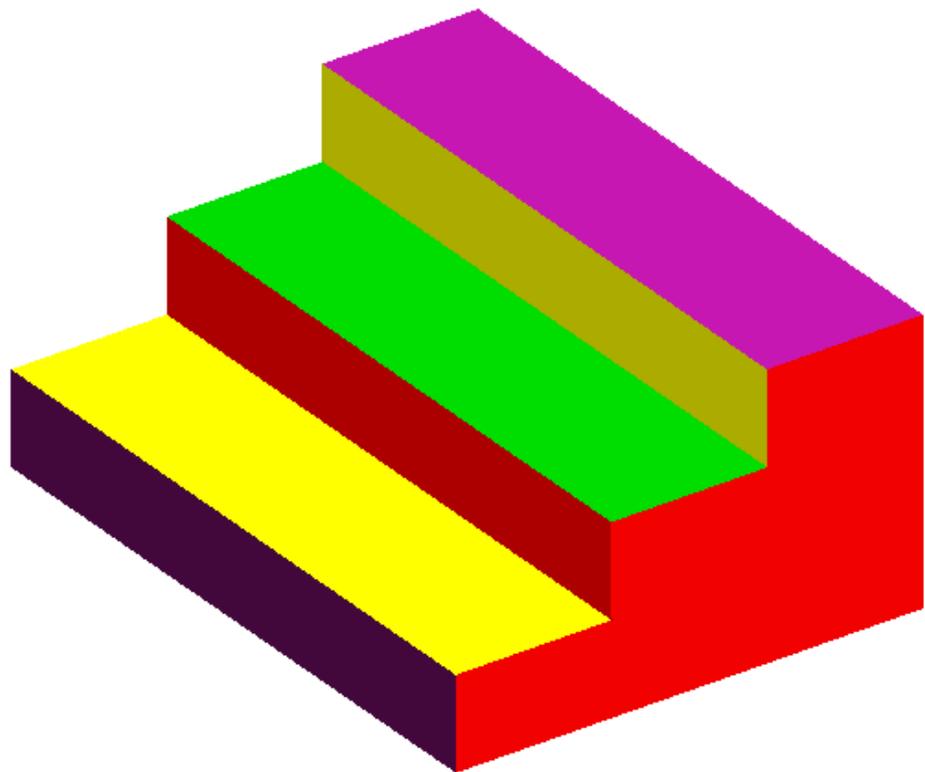
Problem 9

Problem 10

A triangular prism having an equilateral triangular base of sides 30 mm and height 40 mm rests on its base on the ground with one of its vertical edges 10 mm behind the PP. One of the rectangular faces containing that edge is inclined at 40° to the PP and is behind the PP. The station point is 50 mm in front of the PP and 50 mm above the ground. The station point is 15 mm to the right of the edge nearest to the PP. Draw the perspective projection of the prism. Page no 462

Problem 10

30

(q)t

u(r)

(p)s   40°

10

m   P₁ q₁,t₁   r₁   PP   rvp
     s₁   lvp   u₁

50

LINE OF HEIGHTS

15   e

LVP   HL   RVP

m₂   S'   T'   U'

50

Q'

R'   40

P'   GL

m₁

Problem 11

Steps provided for an LIG house consists of three treads of 250 mm each and three rises of 150 mm each. The length of the steps is 1000 mm. The steps are parallel to the picture plane. The nearest face of the steps is 500 mm behind the PP. The station point is 2000 mm in front of the PP and 1000 mm above the ground. The station point lies in a central plane 1250 mm to the right of the right extreme face of the steps. Draw the perspective view of the steps. Page no 453

Problem 11

SCALE 1 : 25
Example :
1 mm = 25 mm
6 mm = 150mm
10 mm = 250 mm
20 mm = 500mm
40 mm = 1000 mm
50 mm = 1250mm
80 mm = 2000mm

1000

250

250

250

500   PP

p(s)   q(r)

s_1 r_1
p_1 q_1

LINE OF HEIGHTS

2000

S

1250

S'   HL

150

P'   Q'

150

S'   R'

1000

150   s'_1 R'_1 GL