(1) List and Sketch at least two types of lines indicating their purpose and applications. (OU/2012)

Ans : a) Continuous Narrow ——— construction lines, Extension lines Leader lines.

b) Long dashed dotted Narrow (Chain narrow) —·——·— Centre lines, Lines of Symmetry

(2) Match the following : (OU/2014)

1) Reduction scale	a) 1 : 1
2) Full scale	b) 100 : 1
3) Enlargement scale	c) 1 : 100

Ans : 1-c, 2-a, 3-b

(3) Match the following sizes of drawing paper as per BIS recommendation : (OU/2014)

Designation	Trimmed size in mm. width x length
1) A_4	a) 420 x 594
2) A_2	b) 210 x 297
3) A_1	c) 297 x 420
4) A_3	d) 594 x 841

Ans : 1-b, 2-a, 3-d, 4-c

(4) Write freehand Vertical Capital alphabets, M and W in single stroke of 5-mm height, take aspect ratio as 7:4 (OU/2010)

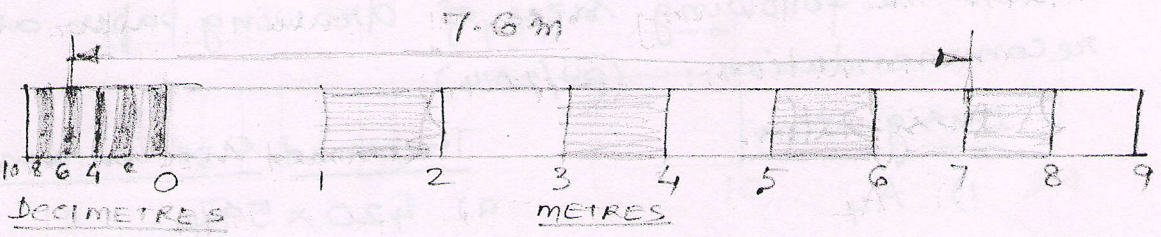
Ans : M W

(5) Construct a scale of 1:100 to read metres and decimetres and long enough to measure 10 metres. Show on it a length of 7.6 m (OU/2010)

Ans: R.F = 1/100

L.O.S. = $\frac{1}{100} \times 10 \times 100$ cm = 10 cm.

- Draw 10cm. long line and divide it into 10 equal parts.
- Each main division indicate 1 metre. Mark '0' at the end of the first main division. Number the main divisions on right of zero as 1, 2, 3...9.
- Now divide the first main division into 10 equal parts. Each sub-division represent 1 decimetre. Number the sub divisions on left of zero as 1, 2, 3....10.
- Distance 7.6m. Can be shown in two parts. i.e, 7 mebie + 0.6 metre. 7 metre is shown on the main divisions and 0.6 metre (i.e 6 decimetres) on the sub divisions.



(6) Fill in the blanks with appropriate word: (OU/2011)

(i) Continuous thin line with zig-zag is used for - - - -

(ii) Dotted line is used for - - - - -

Ans: (i) Long break line, Limits of partial or interrupted views.

(ii) Hidden lines or edges.

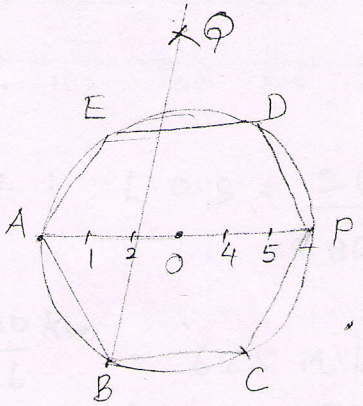
(7) Differentiate between Vernier scale and plain scale. (CU/2012)

Ans. A plain scale is used to indicate the distances in a unit and its immediate sub-division. eg. m and dm. plain scales are simple in construction.

A Vernier scale is used to indicate the distances in a unit and its immediate two sub-divisions. eg. m, dm and cm. It consists of two parts - a main scale and a vernier scale.

(8) Inscribe a regular Hexagon in a circle of 75mm. dia. (CU/2012)

Ans :
- Draw the circle of 75mm. dia. (AP as dia)
- Divide AP into 6 parts
- With radius AP and centres A and P draw arcs intersecting each other at Q.
- Join Q, 2 and extend to meet the circle at B.
- Join AB, which is side of hexagon.
- From B, mark-off other points on circle & join to get hexagon.



(9) What are conics?

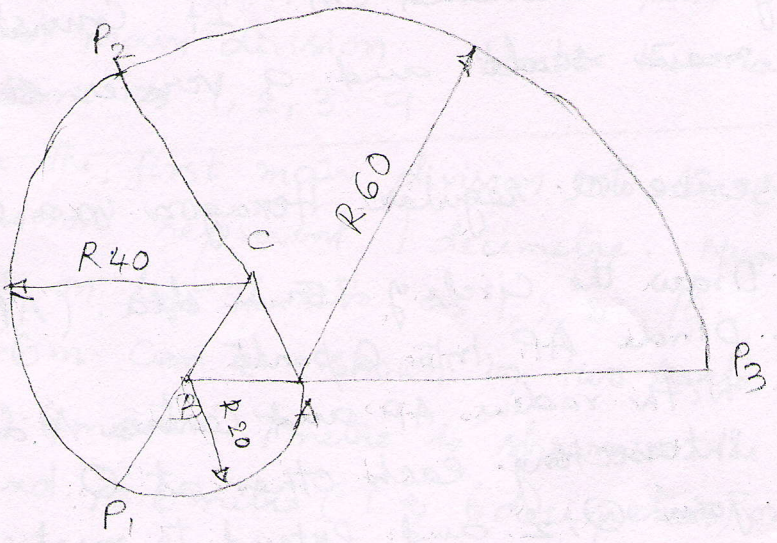
Ans. Sections of a right circular cone obtained by cutting the cone in different ways. An ellipse is obtained when a section plane inclined to axis cuts all generators. A parabola is obtained when section plane parallel to one of generators cuts the cone.

A hyperbola is obtained when a section plane inclined to axis cuts the cone on one side of the axis.

(10) Draw the involute of an equilateral triangle of side 20m

Ans: (OU/2010)

- Draw ΔABC of 20mm. side.
- Assume A as starting point, with B as centre and radius BA, draw arc intersecting line CB extended at P_1.
- With centre C and radius CP_1 draw an arc intersecting the line AC extended at P_2. Similarly repeat for P_3.



Assignment-I / Unit-I / Part-B

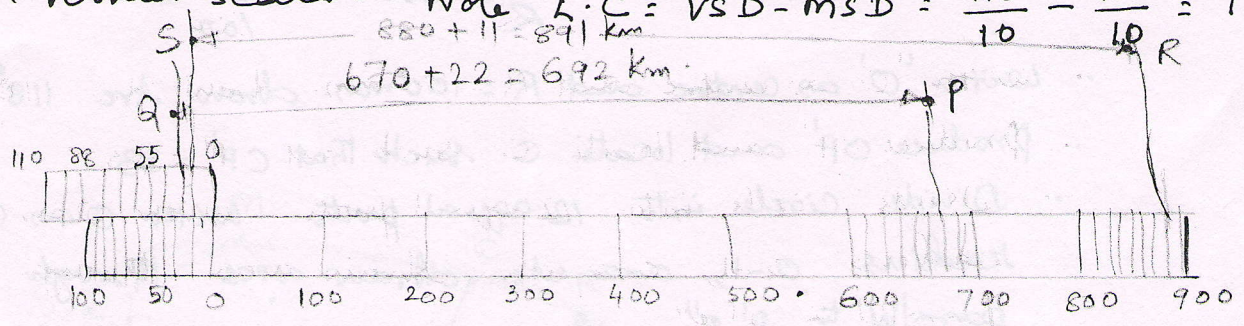
① An actual distance of 980 km between two points on a map is shown by a line 26 cm long. Construct the corresponding Vernier scale of Kilometres and miles. Show on the scale of a distance of 692 and 891 km. Find the corresponding length in miles using the scale. Take 1 mile = 1.6 km. (CU-2014)

Ans. $R.F. = \frac{26\text{ cm}}{980\text{ km}} = \frac{26\ (\text{cm})}{980\times1000\times100\ (\text{cm})}$

$L.O.S. = \frac{26}{980\times1000\times100} \times 1000\ (\text{km})$ → to read upto 1000 km.

$= \frac{26}{980\times100} \times 1000\times100\ (\text{cm}) = 27\ (\text{cm})$

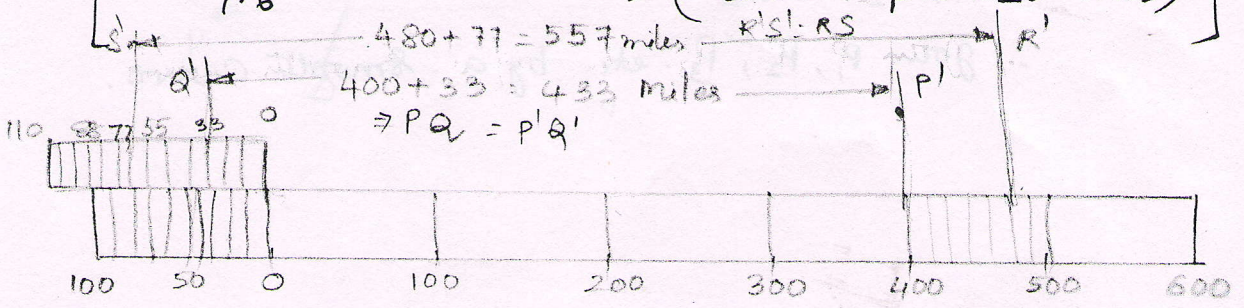
- Kilometre-Scale: Draw a 27 cm long line and construct a vernier scale. Note L.C = VSD − MSD = $\frac{110}{10} - \frac{100}{10} = 1$ km



- Mile Scale: $L.O.S = \frac{26}{980\times1000\times100} \times 625\times1.6\times1000\times100$

$= 27$ cm

$\left[\because \frac{1000\text{ km}}{1.6} = 625\text{ Miles}\ (\in \text{to read upto } 625\text{ miles})\right]$

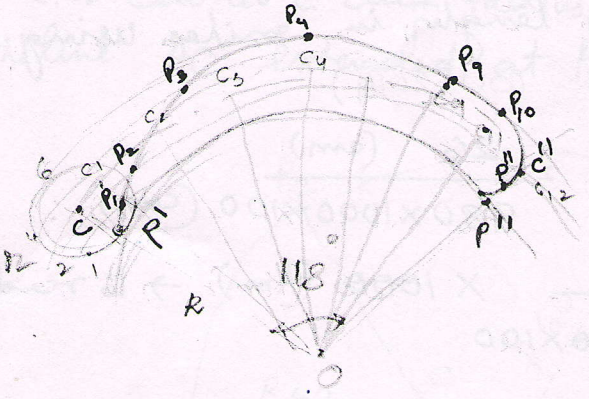


- To show a distance equivalent to 692 km on the mile scale, locate P'Q' such that P'Q' = PQ which measures 433 miles.
- Similarly R'S' = RS which measures 557 miles.

(2) A bicycle has 660 mm. diameter wheels. Draw the locus of a point P, on the circumference of a wheel for its complete revolution when it passes over a segmental arched culvert of radius 2000 mm. Take scale 1:10.

(OU/2014)

Ans.



$r_2 = 330$ Scale 1:10 $\therefore r = 33$

$R = 1000$ $R = 100$

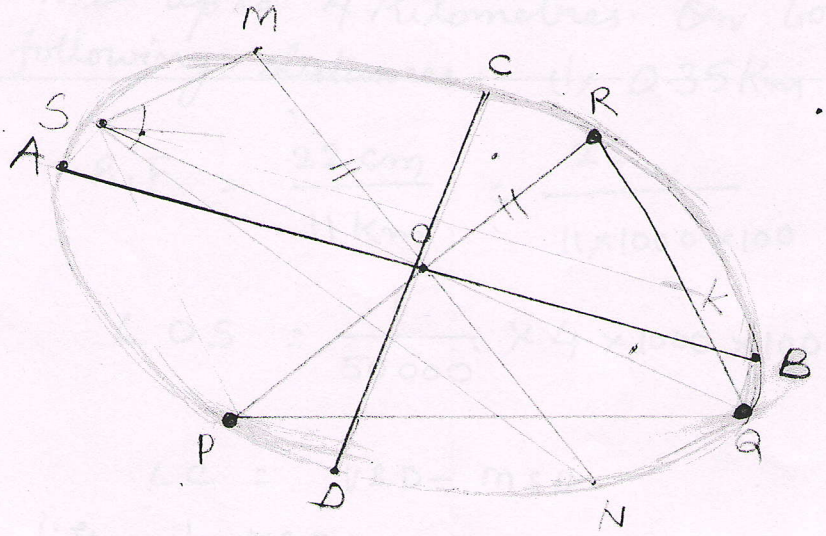
$$\theta = \frac{r}{R} \times 360 = \frac{33}{100} \times 360 = 118^\circ$$

- With 'O' as centre and R = 100 mm. draw Arc 118° ($P'P''$),
- Produce OP' and locate C such that $CP' = 33$
- Divide circle into 12 equal parts. With O as centre and radius O-1, O-2 etc. draw arcs through 1, 2, 3 etc. parallel to $P'P''$.
- Obtain 12 equal divisions on $C-C''$ and name $C_1, C_2 \cdots C_{12}$
- With C_1, C_2 etc. as centres and radius = CP', draw arcs cutting the arcs through 1, 2, ... etc. to locate P_1, P_2 ... etc.
- Join P_1, P_2, P_3 etc. by a smooth curve.

(3) Draw a triangle PQR with PQ = 120 mm. $\angle RPQ = 30^\circ$ and $\angle RQP = 60^\circ$. Draw an ellipse passing through P, Q, R. (OU/2010)

Ans :

- Draw $\triangle PQR$
- Draw parallelogram PQRS such that RS = PQ ; PS = QR
- join SQ. SQ & PR now conjugate axes of ellipse.
- Draw MN = ~~GH~~ PR, the perpendicular bisector of PR. join SM and SN.
- Obtain the bi-sector of $\angle MSN$ i.e SK.
- Through O, draw the major axis AB parallel to SK such that AB = SN + SM.
- Obtain minor axis CD = SN − SM perpendicular to AB at O.
- Construct ellipse by Concentric circles method./or by any method.



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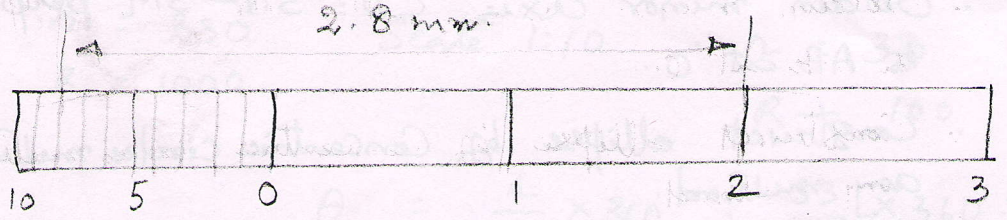
④ Construct a scale to measure one-tenth of mm and mm in which 0.5 mm on a part is represented by a line of 10 mm. Mark on it a length of 2.8 mm. (OU/2007)

- Obtain scale factor : 10/0.5 = 20/1
- L.O.S = $\frac{20}{1} \times 4$ = 80 mm. 4 mm assumed.
- Draw a line 80 mm long and divide into 4 equal parts. Each represents 1 mm.
- Draw plain scale.



1/10 MILLIMETRE

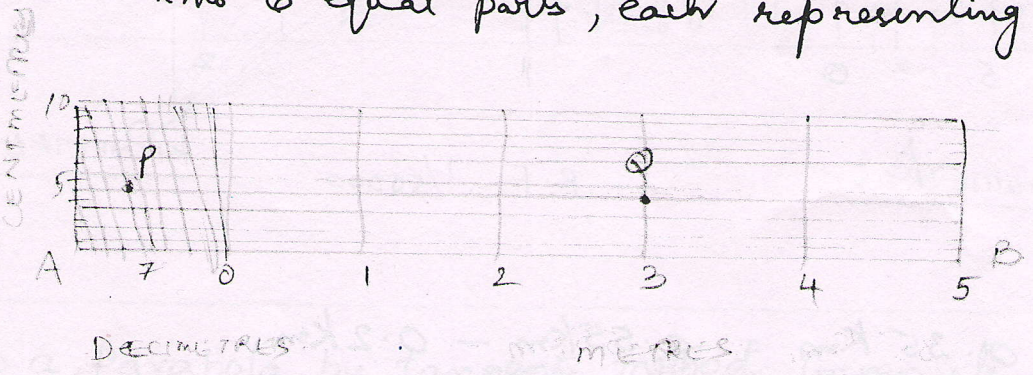
R.F = $\frac{20}{1}$

MILLIMETRE

(5) Construct a diagonal scale of 1/48, showing metres, decimetres and centimetres and to measure up to 6m. Mark a length of 3.76 m. on it. (OU/2008)

Ans.

- Calculate the L.O.S $= \frac{1}{48} \times 6m = 125$ mm.
- Draw a line AB = 125 mm. long and divide it into 6 equal parts, each representing 1m.



R.F. = 1/48

PQ = 3.75 m

(6) On a map, the distance of 11 kilometres is shown by a 22 cm. long line. Find the RF. Construct a backward Vernier scale of this R.F. to read decametres and measure up to 4 kilometres. On both the scales, show the following distances: (i) 0.35 Km (ii) 1.19 km (iii) 2.57 km (OU-2011)

Ans:

$$R.F. = \frac{22\text{ cm}}{11\text{ km}} = \frac{22}{11 \times 1000 \times 100} = \frac{1}{50000}$$

$$L.O.S = \frac{1}{50000} \times 4 \times 1000 \times 100 = 8\text{ cm}.$$

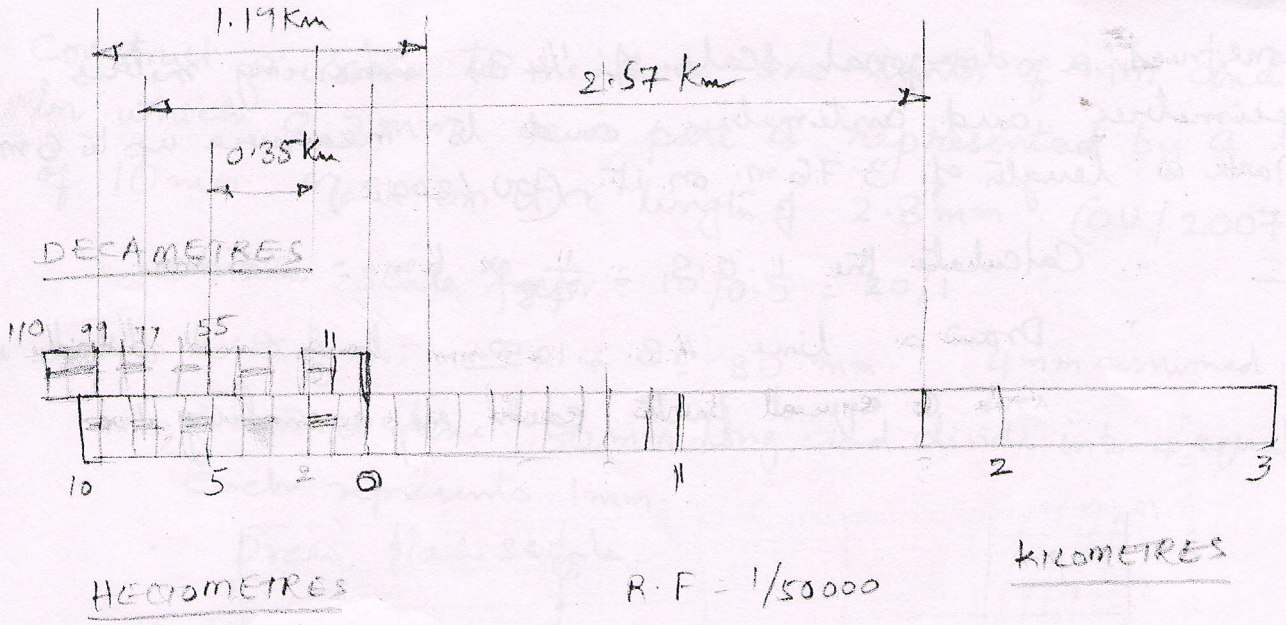
$$LC = VSD - MSD$$

i.e $\frac{1}{10} MSD = VSD - MSD$

$$10\,VSD = 11\,MSD.$$

Vernier length = 11 MSD.

- Draw a vernier of length = 11 (Hectometres) and divide it into 10 equal parts so that each VSD = 1.1 hm. = 11 dam.



(i) $0.35\ Km = 0.55km - 0.2km.$

(ii) $1.19\ Km = 0.99\ Km + 0.2km$

(iii) $2.57\ Km = 0.77\ Km + 1.8\ Km.$

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(7) Construct a rectangular hyperbola when a point 'P' on it is at a distance of 18 and 34 from two asymptotes. (OU/2009)

Ans:

- Draw asymptotes OA and OB at right angles to each other and locate 'P'.
- Draw CD and EF passing through P and parallel to OA and OB.
- Locate points 1, 2 ... along CD (need not be equal)
- Join 1, 2, ... etc. to O and obtain 1', 2', 3'.. on EF.
- Draw lines through 1, 2, ... etc. parallel to EF and 1', 2' ... etc. parallel to CD. to intersect at P_1, P_2 ... etc.
- Draw a smooth curve through P, P_2 ... etc.

(9) A room of $1000\ m^3$ volume is represented by a block of $125\ cm^3$ volume. Find R.F. and Construct a plain scale to measure up to 30m. Measure a distance of 18m. on the scale. (OU/2007)

Ans: 1) $125\ cm^3 = 1000\ m^3$. (or) $5\ cm = 10\ m$.

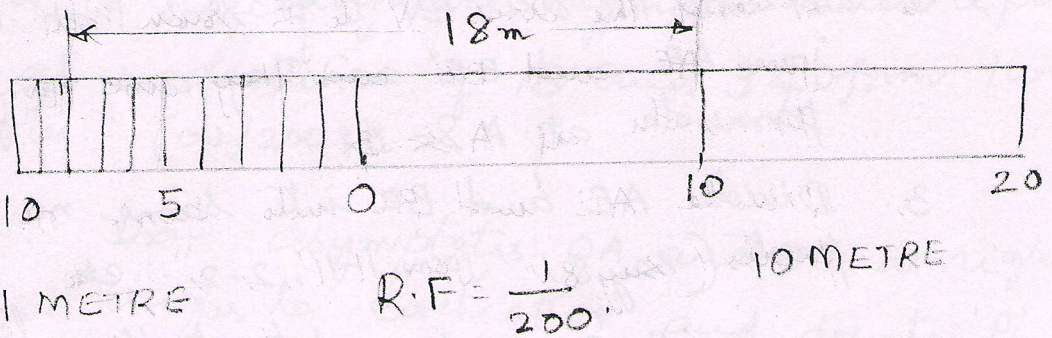
$$\left[\because \sqrt[3]{125\ cm^3} = \sqrt[3]{1000\ m^3}\right]$$

$$\therefore R.F = \frac{5\ cm}{10\ m} = \frac{1\ cm}{2\ m} = \frac{1\ cm}{2 \times 100} = \frac{1}{200}.$$

2) Length of Scale $= \frac{1}{200} \times 30 \times 100 = 15\ cm$.

3) Draw & divide rectangle into 3 equal divisions each 10m. Mark Zero at the end of first division.

4) Divide first segment into 10 equal divisions. each showing one metre.



R.F = $\frac{1}{200}$.

B. Kshetra Mohan / 9963376855