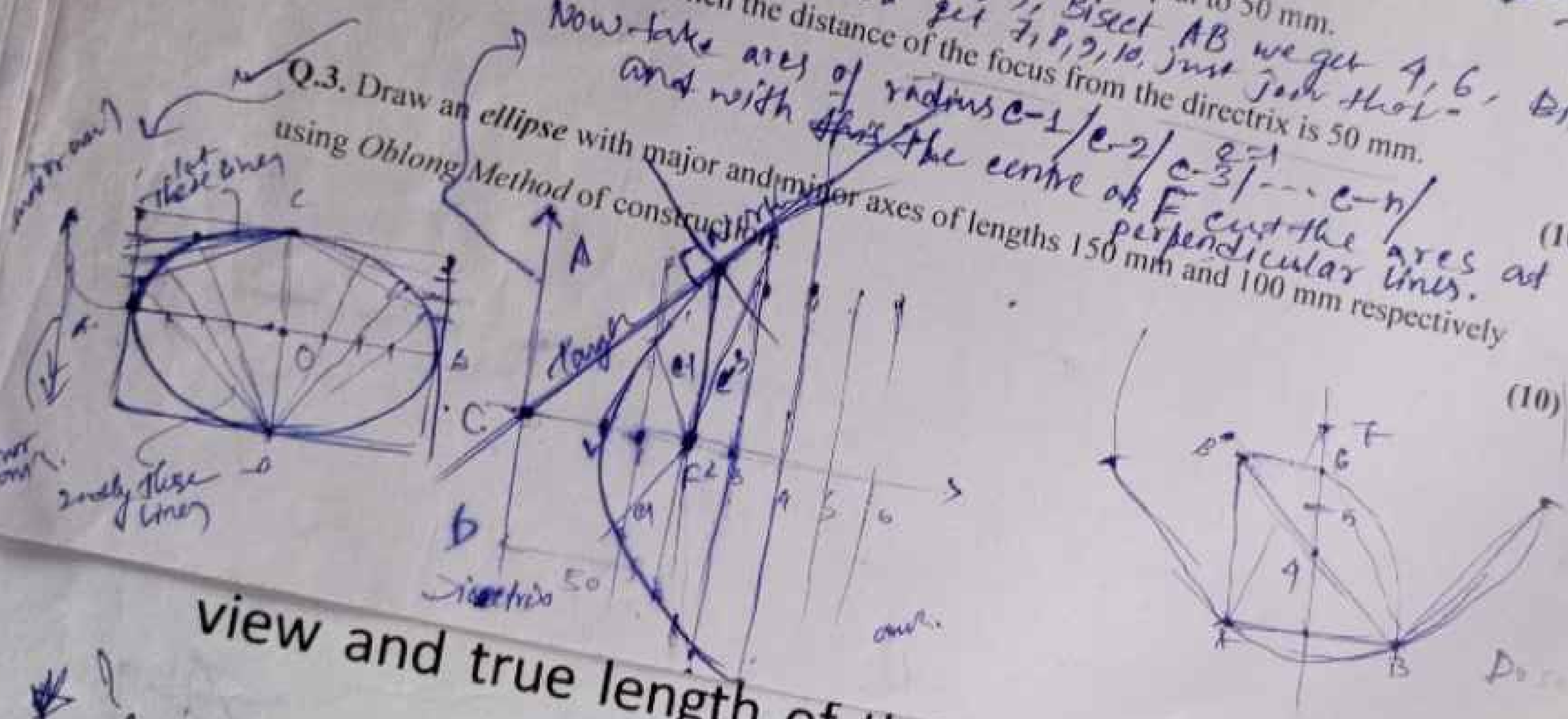
Section: 14 Autumn 2022-2023	**CE13001 Engineering Drawing** Assignment No. 1 (Conics and Engineering Curves I)	Date:17/11/2022 Full marks: 30

Q.1. Draw a regular *Heptagon* having the length of its side equal to 50 mm. (10)

Q.2. Construct *Parabola* when the distance of the focus from the directrix is 50 mm. (10)

Q.3. Draw an *ellipse* with major and minor axes of lengths 150 mm and 100 mm respectively using *Oblong Method* of construction. (10)



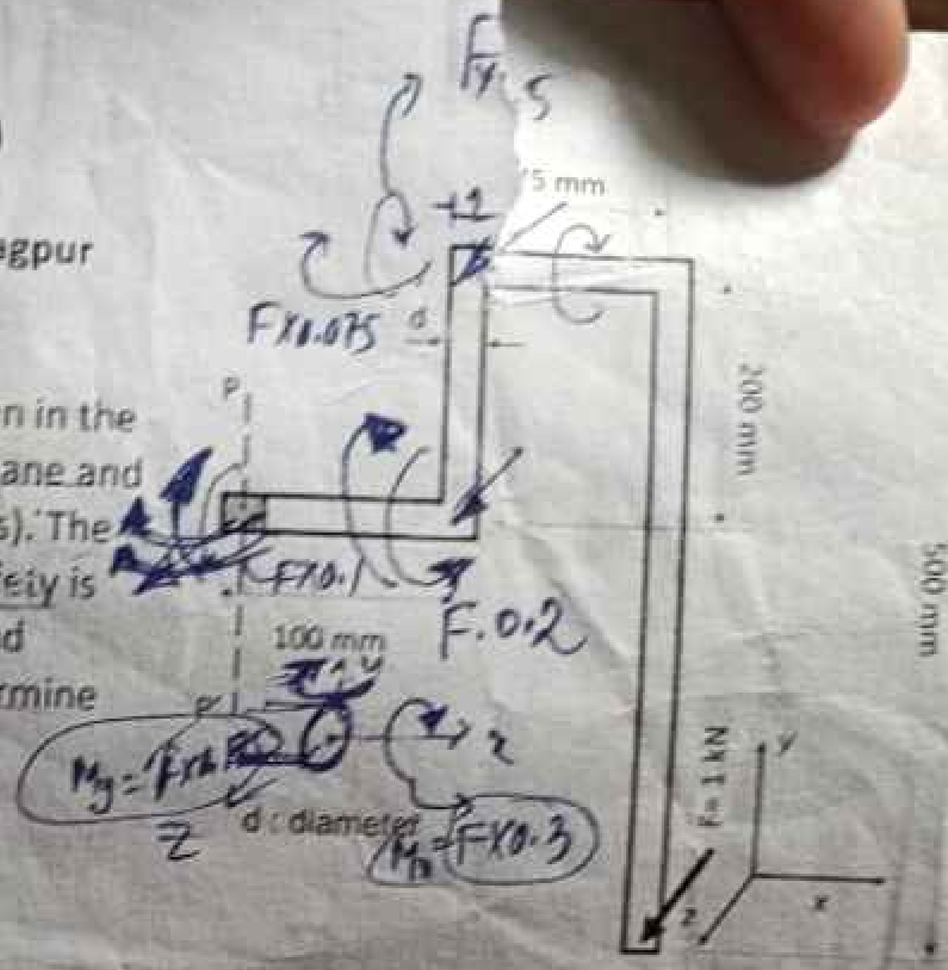
view and true length of the line. Also determ

A line AB of length 80 mm is inclined at 45° line which is situated 20 mm from the e in front of V.P. Determine the projectio

Design of Machine Elements (Class Test – 1)
[Sept. 09, 2024, 5:00PM] {Duration: 1 hour}
Department of Mechanical Engineering, IIT Kharagpur

Q1. The dimensions of a machine component are given in the figure. All the dimensions are mentioned on the x-y plane and a force F is acting out of the plane (along the +ve z axis). The component is made of steel 30C8 and the factor of safety is 2.5. Using the Distortion Energy (Von Mises) theory and Maximum Shear Stress (Tresca) theory of failure, determine the diameter d at the section PP'.

Due to shear force. Shear stress is negligible compared to σ_b, τ_T



Q2. A forged cantilever (made of steel 50C4) is 200 mm long having square cross-section (a^2). Taking factor of safety of 2 and reliability 90%, determine side a for following two loading conditions for a loading-life cycle of 10^5.

a) Subjected to an axial load which varies from 450 N (compression) to 150 N (tension).
b) Subjected to an axial load which varies from 150 N (compression) to 450 N (tension).

Assume strength under compression is same as that of under tension for the above material. Consider Goodman line for design.

Design of Machine Elements (Class Test – 2)
[Nov. 11, 2024, 5:00PM] {Duration: 45 mins}
Department of Mechanical Engineering, IIT Kharagpur

Q1. What is the required basic dynamic load rating C for a ball bearing to carry a radial load of 550 Kg from a shaft rotating at 500 rpm that is part of an assembly conveyor in manufacturing plant? (Take the design life of bearing as 1000 million revolutions).

Q2. A full journal bearing having clearance to radius ratio of 1/100, using a lubricant with absolute viscosity 28 cP, supports the journal running at 2400 rpm. If the bearing pressure is 1.4 MPa, then find the Sommerfeld number.

Q3. A lightly loaded full journal bearing has a journal of 50 mm diameter, bush bore of 50.50 mm diameter and bush length of 20 mm. If rotational speed of journal is 1200 rpm and average viscosity of liquid lubricant is 0.03 Pa-s, then what will be the power loss.

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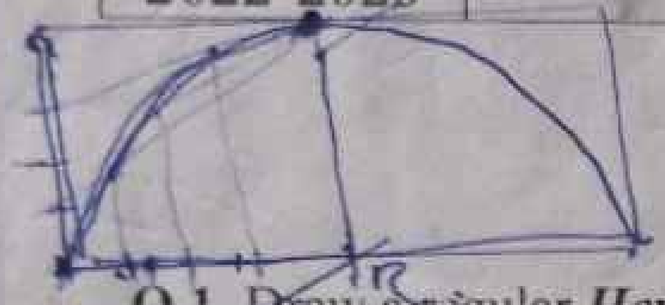
Section: 14 Autumn 2022-2023	**CE13001 Engineering Drawing** Assignment No. 1 (Conics and Engineering Curves I)	Date:17/11/2022 Full marks: 30



Student

Q.1. Draw a regular ***Heptagon*** having the length of its side equal to 50 mm. **(10)**

→ First make a triangle, connect arc (BB'), Bisect AB we get 4, 6. Bisect 4-6 we get 5, by using compass we'll get 7, 8, 9, 10. Just join them.

Q.2. Construct ***Parabola*** when the distance of the focus from the directrix is 50 mm. **(10)**

Now take arcs of radius C-1 / C-2 / C-3 / ... C-n / and with the centre as F cut the arcs at 1/2/3 ... n perpendicular lines.

Q.3. Draw an ***ellipse*** with major and minor axes of lengths 150 mm and 100 mm respectively using *Oblong Method* of construction. **(10)**

view and true length of the line. Also determine the

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Section: 14 Autumn 2022-2023	**CE13001 Engineering Drawing** Assignment No. 2 (Engineering Curves II)	Date:24/11/2022 Full marks: 40

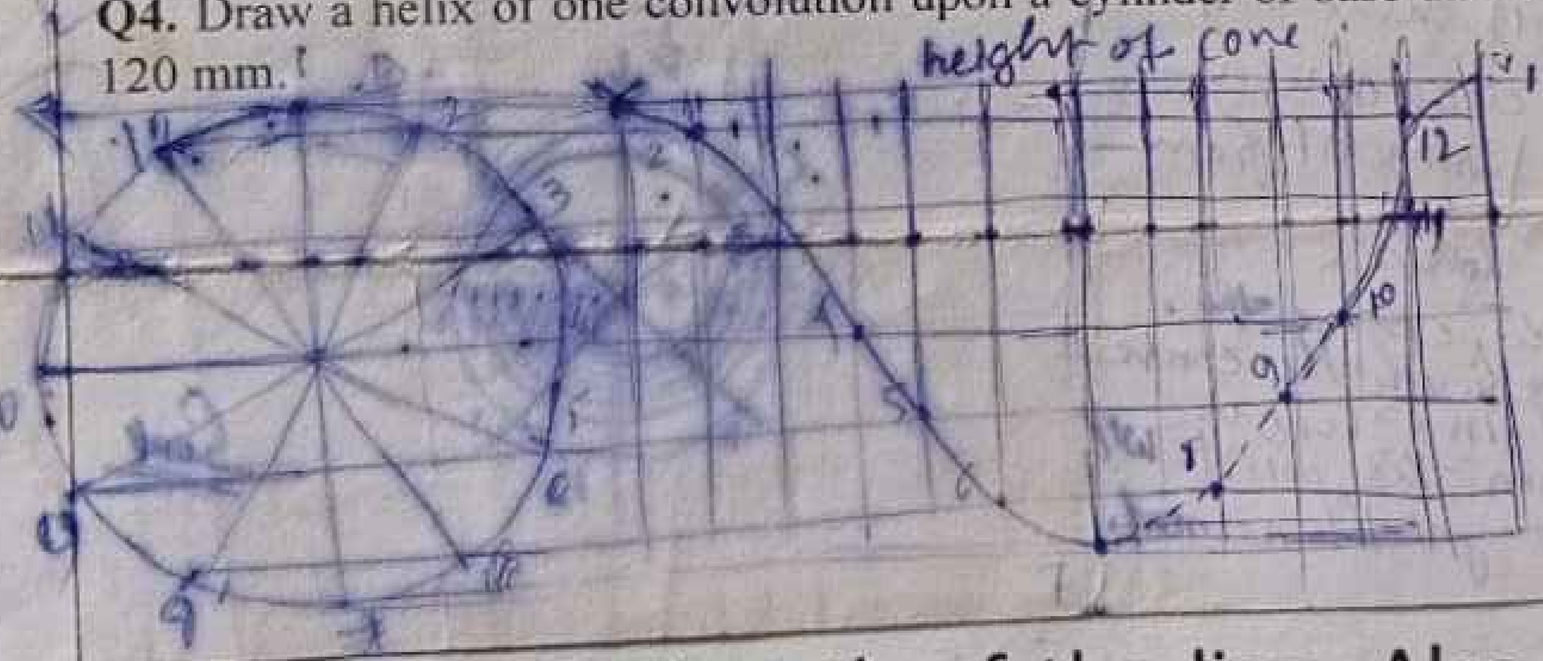
@Student.

Q1. A circle of 50 mm diameter rolls on a horizontal straight line for a full revolution. Draw the curve traced out by a point P, initially at bottom on the circumference of the circle. Name the curve. **(10)**

Q2. Draw the involute of a circle of 50 mm diameter. Also draw a normal and a tangent to it at a point 120 mm from the center of the circle. **(10)**

Q3. Draw a an Archemedian spiral of one convolution and having shortest and longest radius vectors of 10 mm and 50 mm lengths respectively. **(10)**

Q4. Draw a helix of one convolution upon a cylinder of base diameter 90 mm and height 120 mm. **(10)**



view and true length of the line. Also determine inclination o

1. A line AB of length 80 mm is inclined at 45° to H.P. and 30° to V

Assignment 3

Title: Projection of lines

1. A line AB, 50 mm long, has its end A in both the H.P. and the V.P. It is inclined at 30° to H.P. and at 45° to the V.P. Draw the projections. (**pg. 214, Problem 10-8**)

2. A line AB, 65 mm long, has its end A 20 mm above the H.P. and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and show its inclinations (true angle) with the H.P. and the V.P. (**pg. 217; Problem 10-12**)

3. A line AB is inclined at 30^0 to the H.P. and it is in the first quadrant. The end A is 15 mm above the H.P and 20 mm in front of the V.P. The mid-point of the line is 40 mm above H.P. The distance between the end projectors of the line is 70 mm. Draw the projections of the line AB. Determine the length of front view and top view and true length of the line. Also determine inclination of line with the V.P.

4. A line AB of length 80 mm is inclined at 45° to H.P. and 30° to V.P. A point C on the line which is situated 20 mm from the end A and is 30 mm above H.P. and 40 mm in front of V.P. Determine the projections of the line.

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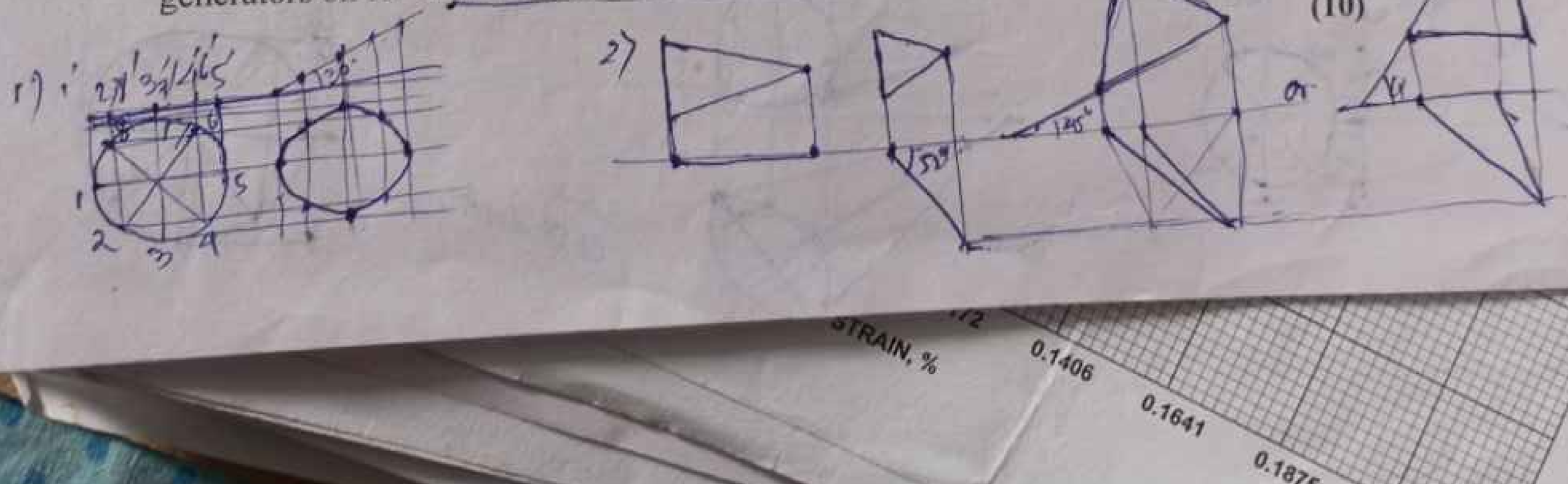
Section: 14 Autumn 2022-2023	**CE13001 Engineering Drawing** Assignment No. 4 (Projections of Planes and Solids)	Date:15/12/2022 Full marks: 40

Q1. A circular disc of 80 mm diameter and of negligible thickness is inclined at 30^0 to the HP and perpendicular to the VP. Its centre is 60 mm from the VP. Draw its projections, including the side view. **(10)**

Q2. A plate having the shape of an isosceles triangle has base 50 mm long and altitude 70 mm. It is so placed that in the front view it is seen as an equilateral triangle of 50 mm side and one side inclined at 45^0 to XY line. Draw its projections. **(10)**

Q3. A Pentagonal prism of side of base 25 mm and length of axis 70 mm is resting on the HP on one of its rectangular faces. Draw its projections when its axis is inclined at 45^0 to VP. **(10)**

Q4. A Cone of base diameter 60 mm and height 100 mm lies on HP with one of its generators on HP and the axis is inclined at 45^0 to VP. Draw its top and front views. **(10)**



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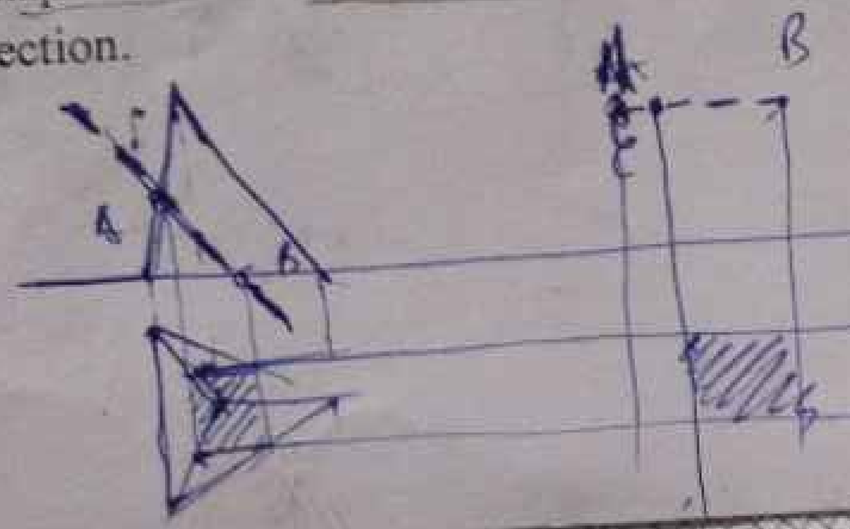
Section: 14 Autumn 2022-2023	**CE13001 Engineering Drawing** Assignment No. 5 (Sections of Solids)	Date:29/12/2022 Full marks: 30

@Sadena.

Q1. A hexagonal pyramid, with 25 mm edges at its base and axis 50 mm long, rests on one of its triangular side faces with its axis parallel to the VP. It is cut by a section plane perpendicular to the HP, inclined at 30° to the VP, and passing through a point P on the axis, 20 mm from the base. Draw the top view, sectional front view, and true shape of the section. **(15)**

Q2. A Cone, base 75 mm diameter and axis 80 mm long, is resting on its base on H.P. It is cut by a section plane perpendicular to the V.P., inclined at 45° to the H.P. and cutting the axis at a point 35 mm from the apex. Draw the front view, sectional top view, sectional side view and true shape of the section. **(15)**

Q3. A tetrahedron, with 50 mm edges is resting on one of its faces with an edge of that face perpendicular to the VP. It is cut by a sectional plane perpendicular to the VP so that the true shape of the section is a square. Draw the front view, sectional top view, and the true shape of the section. **(10)**



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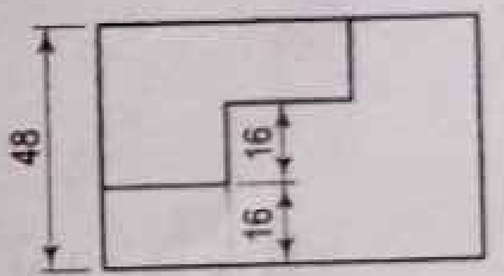
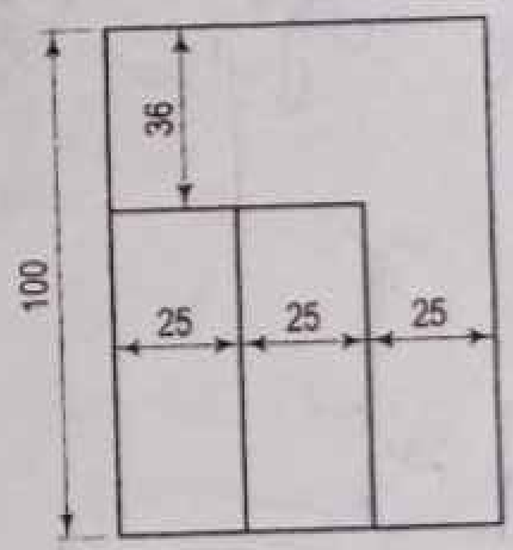
Section: 14 Autumn 2022-2023	**CE13001 Engineering Drawing** Assignment No. 6 (Isometric View and Projection)	Date: 5/01/2023 Full marks: 50

Q1. Draw the isometric view of a cylinder, with its base (having 50 mm diameter) on HP and axis (length 75mm) perpendicular to the HP. **(10)**

Q2. Draw the isometric view of the frustum of a hexagonal pyramid, having 75 mm perpendicular height. The length of each side of the base and the top of the frustum is 25 mm and 12 mm respectively. **(10)**

Q3. Draw the isometric view from the front view and top view (first angle method of projection) of an object given beside. **(15)**





Q4. Draw the isometric projection of a hemisphere resting centrally on the top of a cube. Radius of the hemisphere is 20mm and length of each edge of the cube is 40mm. **(15)**

6. The switch in Figure 6 is closed at t: $i(t)$ for $t \geq 0$.

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INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR

Department of Civil Engineering

Exam

@ Student -

Time: 180 minutes | **Section – 18** | ***CE13003: Engineering Drawing***

Maximum Marks: 50 | **January 2023**

(10% for Neatness)

1. Draw a parabola having a distance of 50 mm between the focus and directrix. Draw a normal and a tangent to the parabola at a point 35 mm from the focus. (15)

2. Draw the projections of a regular pentagon of 40 mm side is resting on HP by one of its side and the surface of the pentagon is inclined at 30° to H.P. The side in H.P is inclined at an angle of 60° to the V.P. Note: the pentagon is in 1st quadrant and one end of the side in HP is 35mm in front of VP. (15)

3. A cylinder having 40 mm diameter and 50 mm axis is resting on one point of a base circle on Vertical Plane (VP) while its axis makes 45^0 with VP and Front view (FV) of the axis 35^0 with Horizontal Plane (HP). Draw its projections. (20)

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of Some Part.

6. The switch in Figure 6 is closed at tim
$i(t)$ for $t \geq 0$.

Section: 14 Autumn 2022-2023	**CE13001 Engineering Drawing** Class Test	Date: 12/01/2023 Full marks: 40

Q1. A thread is unwound for one complete revolution around a solid regular octagonal prism with side 20 mm, starting from one of the corners of the octagon, keeping the unwinding end tight. Draw the path traced by the unwinding end of the thread and name the curve so obtained. **(10)**

Q2. A line AB of length 100 mm is inclined at 40° to H.P. and 50° to V.P. A point C on the line which is situated 40 mm from the end A and is 30 mm above H.P. and 40 mm in front of V.P. Determine the projections of the line. **(10)**

Q3. A cone with radius of base 25 mm and 60 mm long perpendicular axis, is resting on the HP on one of its generators, which is also parallel to the VP. It is cut by a section plane, perpendicular to the HP, 60° inclined to the VP and bisecting the axis of the cone. Draw its top view, sectional front view and true shape of the section. **(10)**

Q4. Draw the isometric projection of a hemisphere placed centrally on the top of the frustum of a cone. Radius of base of Cone and Frustum top is 40 mm and 20 mm respectively. Perpendicular height of cone frustum is 60 mm and radius of hemisphere is 20 mm. **(10)**