OR iii. A cylinder of 50 mm diameter and 70 mm long is resting on one of its point of base on HP with its axis inclined at 30° to HP and parallel to VP. A sectional plane perpendicular to HP and inclined at 45° to VP passes through the axis at 25 mm from one end of it. Draw the projections of the cut solid. Also obtain the true shape of the section. **7**

Q.5 i. Explain and differentiate isometric drawing and isometric projection? **4**

ii. A cube of 25 mm edge is placed centrally on the top of another square block of 40 mm edge and 15 mm thickness. The faces of cube and square are parallel. Draw the isometric drawing of the two solids. **6**

OR iii. Draw freehand sketch of the front, top and suitable side view of the object shown in the Figure.2. Dimensions given are in mm. **6**

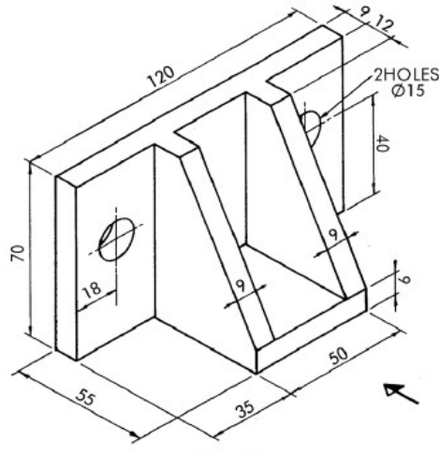

Figure 2

Q.6 Attempt any two:

i. Explain the following commands **5**
(a) Move (b) Array (c) Chamfer (d) Fillet (e) Hatch

ii. Write the steps for drawing a pentagon of 50 mm side in any CAD package such as AutoCAD. **5**

iii. Write any five advantages and five limitations of any CAD package. **5**

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering

End Sem (Odd) Examination Dec-2017

EN3ES02 Engineering Graphics

Programme: B.Tech. Branch/Specialisation: All

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. 'Representative fraction' (RF) is defined as **1**
(a) Length of an object in the drawing/Actual length of the object
(b) Length of an object in the drawing/Isometric length of the object
(c) Actual length of the object/Length of an object in the drawing
(d) Isometric length of the object/Length of an object in the drawing

ii. Name the curve traced out by a point on the circumference of a circle, which rolls on another circle of same diameter **1**
(a) Cycloid (b) Hypocycloid
(c) Cardioid (d) Spiral

iii. In orthographic projection, projection lines are ____ to each other. **1**
(a) Parallel (b) Perpendicular
(c) Inclined (d) Any of these

iv. For a line, if Θ + Ø = 90°, then which of the following statements is correct? **1**
(a) $\alpha = \beta = 90^o$
(b) side view = TL
(c) FV is perpendicular to XY
(d) All of these

P.T.O.

v. A tetrahedron has four equal ____ faces **1**
(a) Square (b) Rectangular
(c) Triangular (d) None of these

vi. The sectional planes are represented by **1**
(a) Continuous thick line
(b) Continuous thin line
(c) Chain thin line
(d) Chain thin line having thick edges

vii. The isometric projection of a circle is a **1**
(a) Circle (b) Ellipse (c) Hyperbola (d) Parabola

viii. The method normally used to draw the isometric view of a circle is **1**
(a) Rhombus Method (b) Rectangle Method
(c) Trapezium Method (d) None of these

ix. When drawing a line using the relative coordinate system a line is created from _____. **1**
(a) 0,0
(b) The ending point of the last line
(c) The beginning point of the last line
(d) None of these

x. What you can create from the command offset? **1**
(a) Concentric circle (b) Three parallel lines
(c) Parallel arc (d) All of these

Q.2 i. What is the difference between an enlarging scale and a reducing scale? **3**

ii. A rectangular plot of land measuring 1.28 hectares is represented on a map by a similar rectangle of 8 cm^2. Calculate R.F. of the scale. Draw a diagonal scale to read 1 m and long enough to measure 600 m. Show a distance of 438 m on it. **7**

OR iii. Construct a cycloid having a rolling circle of 50 mm diameter. Draw a normal and tangent to the curve at a point 35 mm above the base line. **7**

Q.3 i. Draw the projections of the following points on a common reference line, keeping the distance between their projectors 30 mm apart. **2**
(a) Point A is 20 mm below the HP and 50 mm in front of the VP.
(b) Point C is 30 mm in front of the VP and in the HP.

ii. A 100 mm long line PQ is inclined at 30° to HP and 45° to VP. Its mid-point is 35 mm above HP and 50 mm in front of VP. Draw its projection and find HT, VT, DEP, DET, LTV, LFV and apparent angles with the principle planes. **8**

OR iii. Draw the front, top and suitable side views of the object shown in the Figure.1. Dimensions given are in mm. **8**

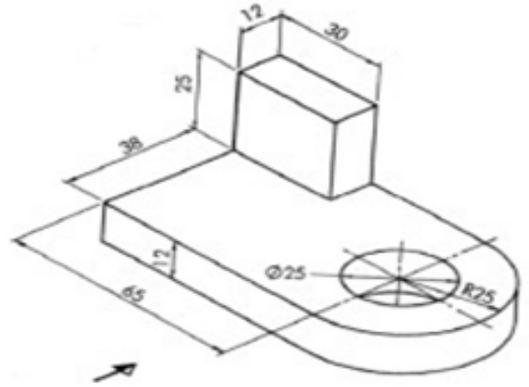


Figure 1

Q.4 i. A circular plate of 50 mm diameter is held such that its plane is perpendicular to HP and inclined at 30° to VP with its centre 30 mm above HP and 20 mm in front of the VP. Draw its Projections. **3**

ii. A pentagonal pyramid of 25 mm edge of base and 60 mm height is resting on the corner of its base on HP and the slant edge containing that corner is inclined at 45° with HP. Draw the projections of solid, when its axis makes an angle of 30° with VP. **7**

EN3ES02 Engineering Graphics

Marking Scheme

Q.1 i. ‘Representative fraction’ (RF) is defined as **1**

a) Length of an object in the drawing/Actual length of the object

ii. Name the curve traced out by a point on the circumference of a circle, which rolls on another circle of same diameter **1**

c) Cardioid

iii. The orthographic projection, projection lines are ____ to each other. **1**

a) Parallel

iv. If $\Theta + \emptyset = 90^{o}$, then which of the following statements is correct? **1**

(d) All of the above

v. A tetrahedron has four equal ____ faces **1**

c) Triangular

vi. The sectional plane are represented by **1**

d) Chain thin line having thick edges

vii. The isometric projection of a circle is a **1**

b) Ellipse

viii. The method normally used to draw a cicle in isometric projection is **1**

a) Rhombus Method

ix. When drawing a line using the relative coordinate system a line is created from _____. **1**

b) the ending point of the last line

x. Which of these can be created using command offset. **1**

d) All of these

Q.2 i. difference between an enlarging scale and a reducing scale…..3 marks **3**

Solution

Enlarging scale:

In some cases when the objects are very small like inside parts of a wrist watch, the dimensions adopted on the drawing will be bigger than the actual dimensions of the objects then in that case it is represented by scale and RF as

Scale: - 10cm=1cm or 10:1 and by R.F= 10/1 (greater than one)

Reducing Scale:

When the dimensions on the drawing are smaller than the actual dimensions of the object. It is represented by the scale and RF as

Scale: - 1cm=100cm or 1:100 and by RF=1/100 (less than one)

ii. Finding RF…….2 marks **7**

Drawing scale……..3 marks

Showing distance……1 mark

Showing units……1 mark

SOLUTION :

1 hector = 10, 000 sq. meters

1.28 hectors = 1.28 X 10, 000 sq. meters

$= 1.28 \times 10^{4} \times 10^{4}$ sq. cm

8 sq. cm area on map represents

$= 1.28 \times 10^{4} \times 10^{4}$ sq. cm on land

1 cm sq. on map represents

$= 1.28 \times 10^{4} \times 10^{4} / 8$ sq cm on land

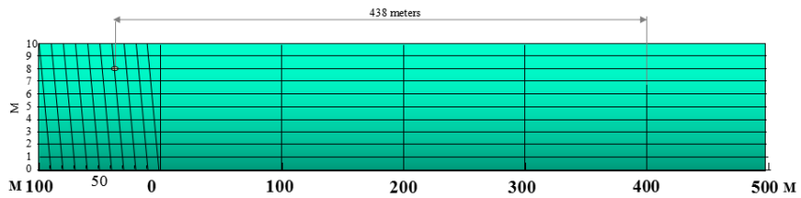
1 cm on map represent

$= \sqrt{1.28 \times 10^{4} \times 10^{4} / 8}$ cm

= 4, 000 cm

1 cm on drawing represent 4, 000 cm, Means RF = 1 / 4000

Assuming length of scale 15 cm, it will represent 600 m.

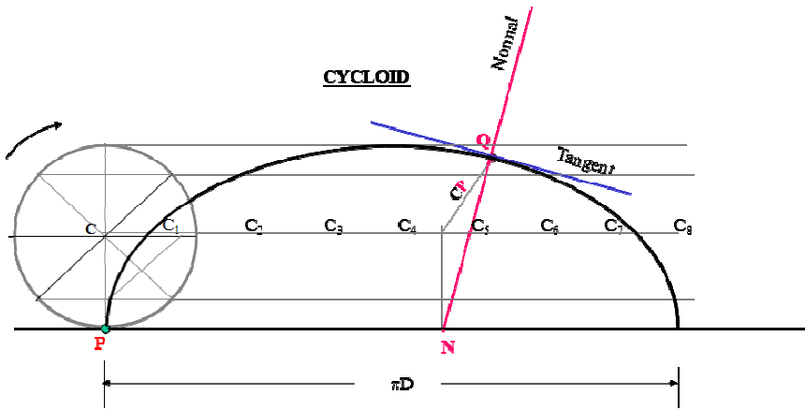


R.F. = 1 / 4000

DIAGONAL SCALE SHOWING METERS.

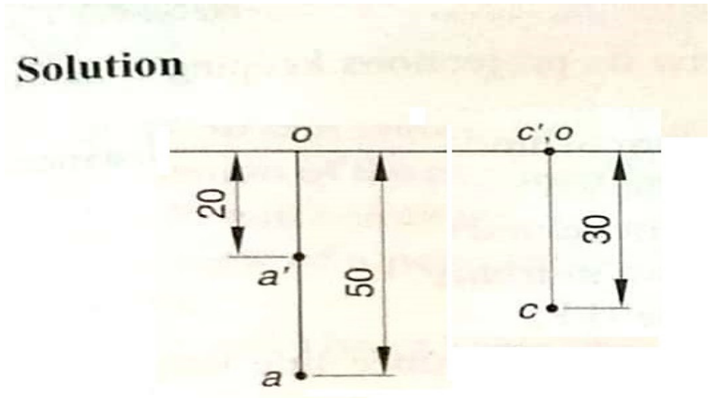
OR iii. Drawing Cycloid…….5 marks **7**

Tangent and Curve……..2 marks



Q.3 i. Point A is 20 mm below the HP and 50 mm in front of the VP……..1 mark **2**

Point C is 30 mm in front of the VP and in the HP…….1 mark



ii. Find HT, VT, DEP, DET, LTV, LFV and apparent angles with the principle plains……1 mark each **8**

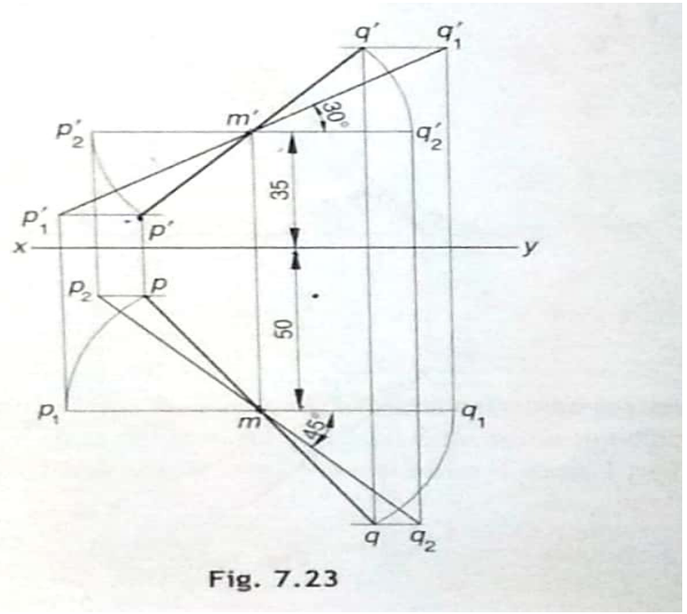
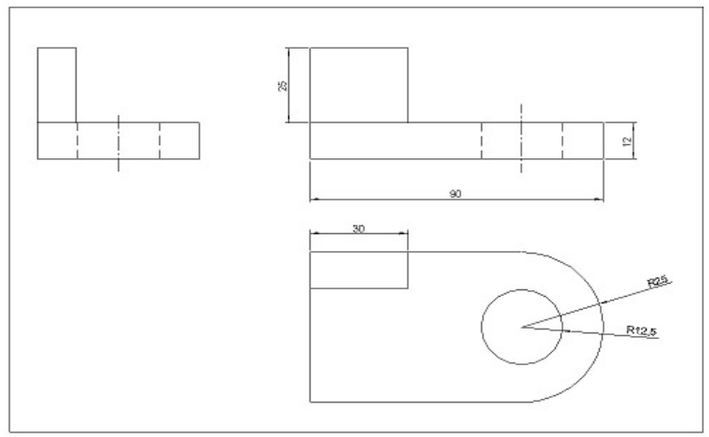


Fig. 7.23

OR iii. Front View……2 marks **8**
Top View……..2 marks
Side View……..2 marks
Dimensions……2 marks



Q.4 i. Two step Solution **3**

first step ……1 mark

Second Step…… 2 marks

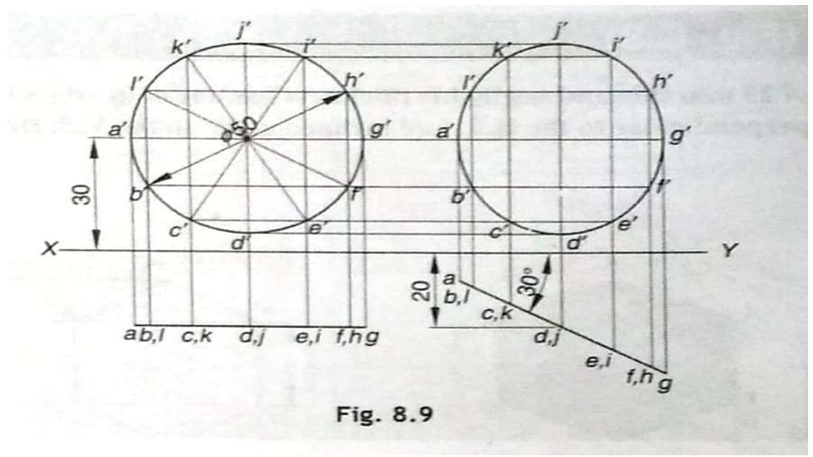


Fig. 8.9

ii. Three step Solution **7**

first step ……1 mark

Second Step…… 2 marks

Third Step…….4 marks

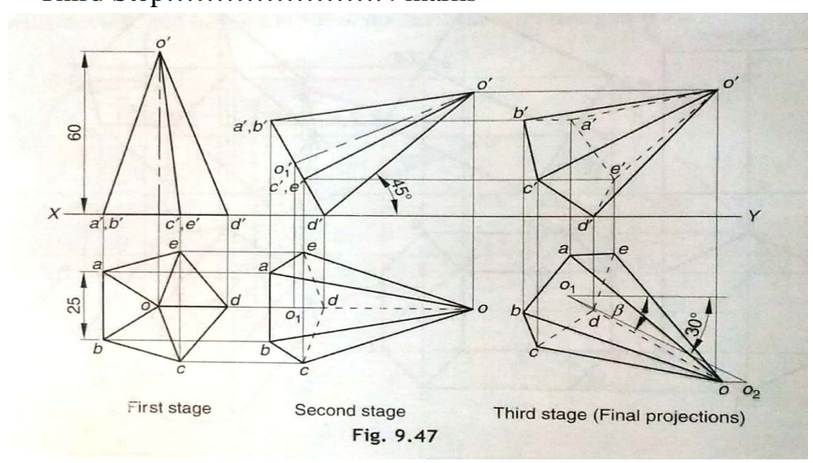


Fig. 9.47

OR iii. Three step Solution **7**

first step ……1 mark

Second Step…… 2 marks

Third Step…….4 marks

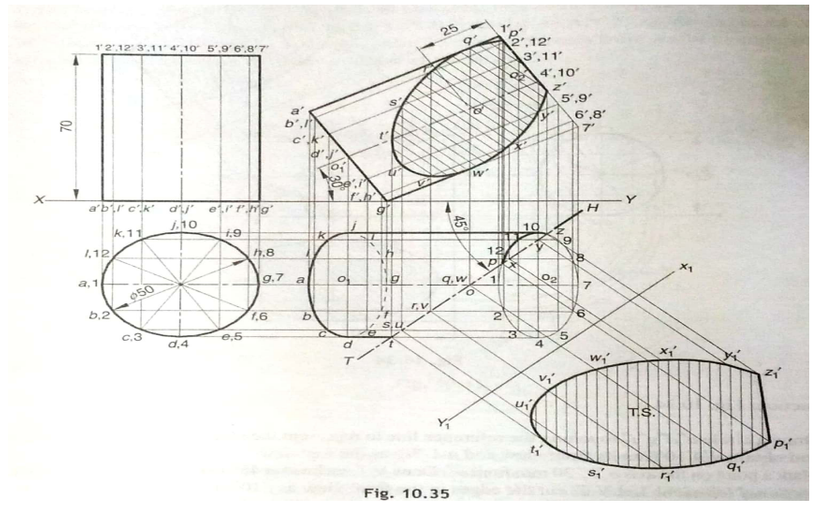


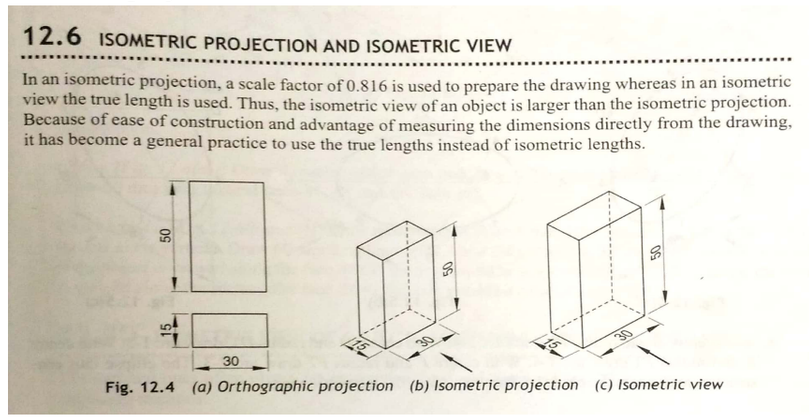
Fig. 10.35

Q.5 i. Definition Isometric drawing…….2 marks **4**

isometric projection……..2 marks

ii. isometric drawing of the cuboid……3 marks **6**

isometric drawing of cube…….3 marks



12.6 ISOMETRIC PROJECTION AND ISOMETRIC VIEW

In an isometric projection, a scale factor of 0.816 is used to prepare the drawing whereas in an isometric view the true length is used. Thus, the isometric view of an object is larger than the isometric projection. Because of ease of construction and advantage of measuring the dimensions directly from the drawing, it has become a general practice to use the true lengths instead of isometric lengths.

Fig. 12.4 *(a) Orthographic projection (b) Isometric projection (c) Isometric view*

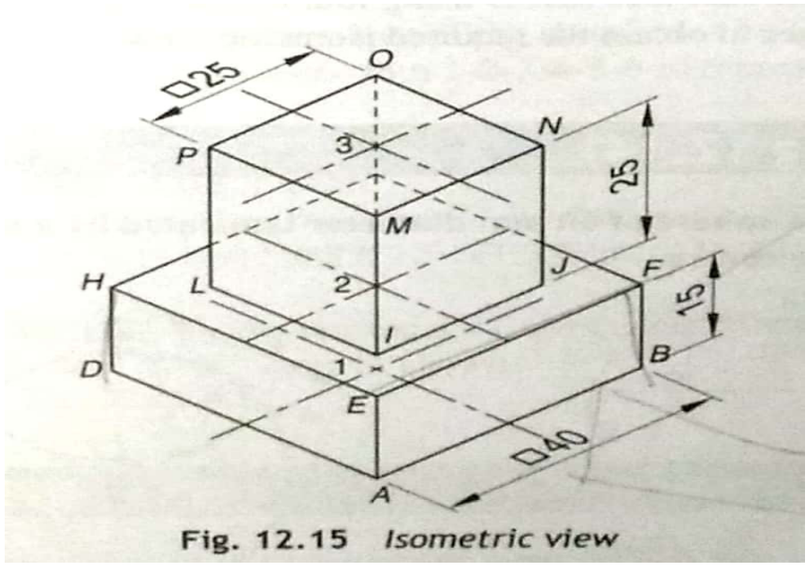
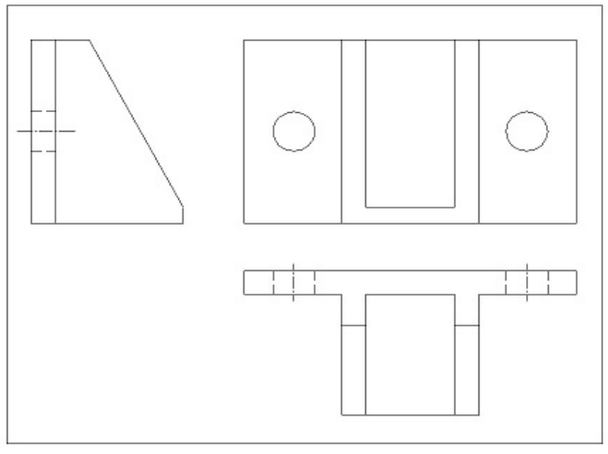


Fig. 12.15 *Isometric view*

OR iii. Freehand sketch of the front……..2 marks **6**
top view ……2 marks
side view……..2 marks



Q.6 Attempt any two:

i. Explaining commands……1 mark each. **5**

(a) Move

Moves objects a specified distance in a specified direction.

(b) Array

Creates copies of objects arranged in a pattern. can create copies of objects in a regularly spaced rectangular, polar, or path array.

(c) Chamfer

Bevels or chamfers the edges of two 2D objects or the adjacent faces of a 3D solid. A bevel or chamfer is an angled line that meets the endpoints of two straight 2D objects.

a sloped transition between two surfaces or adjacent faces on a 3D solid.

(d) Fillet

Rounds or fillets the edges of two 2D objects or the adjacent faces of a 3D solid. A round or fillet is an arc that is created tangent between two 2D objects.

a curved transition between two surfaces or adjacent faces on a 3D solid.

(e) Hatch

Fills an enclosed area or selected objects with a hatch pattern, solid fill, or gradient fill.

ii. writing steps……5 mark **5**

Using polygon Command

Step 1: Click Polygon from the Rectangle drop-down list on the Draw panel of the Home tab, or type POL and press Enter.

Step 2: Type the number of sides for the polygon that you want to draw and then press Enter.

Step 3: Specify the center point by clicking a point or typing coordinates.

Step 4: Type I (for inscribed) or C (for circumscribed), and press Enter.

Step 5: Specify the radius by typing a distance or clicking a point.

iii. Write any five advantages……1/2 marks each **5**
five disadvantages of AUTOCAD……..1/2 marks each

Advantages:

1. User Friendly
2. Fulfills most of the professional needs of a mechanical

engineer
3. Lots of Time saving (but not always)
4. Ease of Accuracy — e.g. joining of lines head to head is not possible manually with desired accuracy
5. Easy to edit
6. Ease of Repetition / Addition
7. Reproduction of Drawing is easy, rapid and reliable in terms of dimensional accuracy and precision.
8. 2D and 3D production of drawings is very easy.
9. Zoom Command Facility allows us to see the minute details on larger scale view.

Disadvantages:
1. Expensive equipment is required. like Computer, Plotter, big screen monitor etc.
2. Registered software is expensive and it requires a heavy re-occurring annual fee.
3. Equipment is fragile, can be damaged drastically.
4. Continuous Updating of the equipment and software is needed.
5. Data storage is also fragile — high probability of data corruption
6. Piracy and hacking threats are always there when you use internet for data transfer or even storage of data on a computer which is connected to internet.
7. Special computer Skills are required.
8. Proper Maintenance, supervision and administration is required for computer networking.

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