



Subject Code: **17622**

SUMMER – 16 EXAMINATIONS

Model Answer

Page No: ____/ N

Important Instructions to examiners:

- 1) The answers should be examined by key words and not as word-to-word as given in the model answer scheme.
- 2) The model answer and the answer written by candidate may vary but the examiner may try to assess the understanding level of the candidate.
- 3) The language errors such as grammatical, spelling errors should not be given more importance. (Not applicable for subject English and Communication Skills)
- 4) While assessing figures, examiner may give credit for principal components indicated in the figure. The figures drawn by candidate and model answer may vary. The examiner may give credit for any equivalent figure drawn.
- 5) Credits may be given step wise for numerical problems. In some cases, the assumed constant values may vary and there may be some difference in the candidate's answers and model answer.
- 6) In case of some questions credit may be given by judgment on part of examiner of relevant answer based on candidate's understanding.
- 7) For programming language papers, credit may be given to any other program based on equivalent concept.



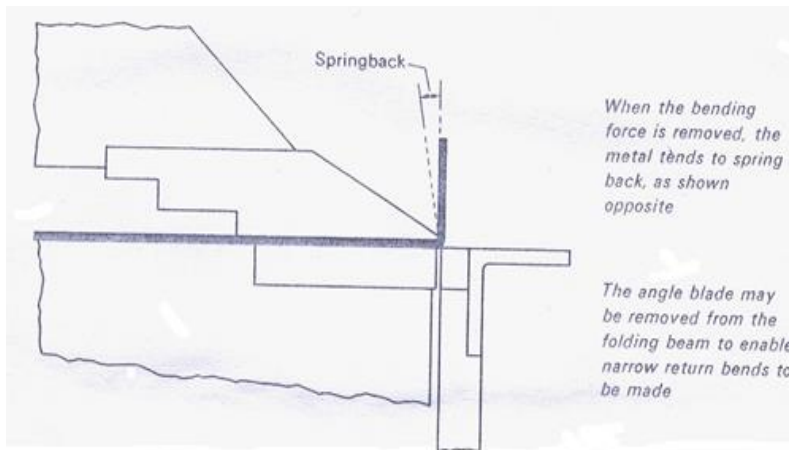
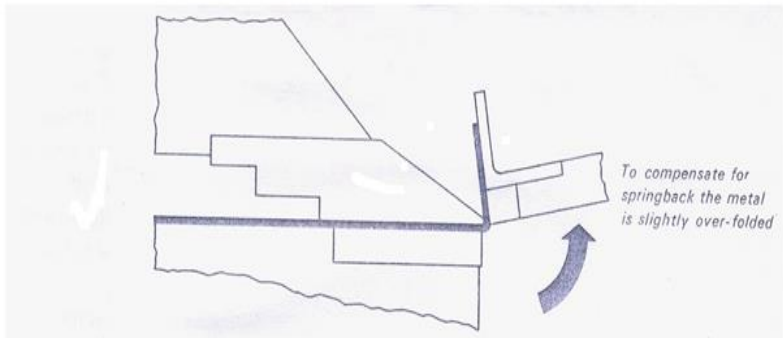
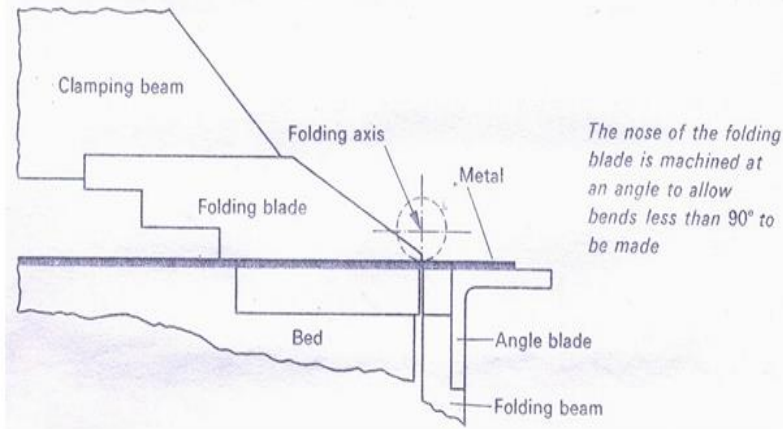
Q. NO.	MODEL ANSWER	MARKS	TOTAL									
1. (A)	Attempt any <u>Three</u> of the following	3x4marks	12									
a.	<p>Shear angle: The angle between the fixed bottom blade and movable upper blade is the shear angle.</p> <p>Rake angle: The shear blades are provided with a rake angle of 3⁰(approx.) and an optimum rake angle enables the blades to dig into the material, thereby subjecting the internal fibers of the metal to plastic deformation prior to shearing.</p> <p>Too much of the rake angle weaken the blades and too less a rake angle requires more force to initiate plastic deformation.</p> <p>Basic Principle of Shearing: The basic principle of shearing works on the principle of force applied onto a pivot. As shown in the fig. when a force is applied on the handle, the blade is moved against the pivot. This force and the shear angle between the two blades help to shear the sheet metal.</p>	<p>01 mark</p> <p>01 mark</p> <p>02 mark</p>	04									
b.	<p>The types of rotary shear machine are:</p> <ol style="list-style-type: none"> 1) Bench rotary or parallel shaft shear 2) Throat less or inclined shaft shear <p>Advantages of rotary machine:</p> <ol style="list-style-type: none"> 1) Circular or irregular shapes can be easily cut. 2) There is no restriction in the length of cut as in case of straight shear machine. 3) Cutter produces a continuous rotating action as in case of straight shear a single shear is done at single cut. 4) Very less distortion of material. 5) These can be hand or power driven and can be very handy. 	<p>01mark</p> <p>03 mark (any three point)</p>	04									
c.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Sr.no.</th> <th style="text-align: center;">Cropping</th> <th style="text-align: center;">Notching</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1.</td> <td>The shearing of rolled steel section is performed in dies designed to suit the section. The dies are mounted in a special shearing machine. This operation is called cropping.</td> <td>Notching is the operation where the plate may cutting to change the section.</td> </tr> <tr> <td style="text-align: center;">2.</td> <td>This operation is mainly used for sheet metal</td> <td>This operation is not only used for sheet metal but also to round bars</td> </tr> </tbody> </table>	Sr.no.	Cropping	Notching	1.	The shearing of rolled steel section is performed in dies designed to suit the section. The dies are mounted in a special shearing machine. This operation is called cropping.	Notching is the operation where the plate may cutting to change the section.	2.	This operation is mainly used for sheet metal	This operation is not only used for sheet metal but also to round bars	04 marks	04
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2.	This operation is mainly used for sheet metal	This operation is not only used for sheet metal but also to round bars										



	plates.	or plates		
	3.	It used so that bending of sheet metals can be done easily.	It is done so that two different plates can be joint at any angle.	
	4.	This process is normally done with the help of snips.	This process is normally done with the help of power machine.	
d.	<ul style="list-style-type: none"> • PRE-OPERATIONAL SAFETY CHECKS 1. Check workspaces and walkways to ensure that no slip/trip hazards are present. 2. Ensure saw blade is in good condition. 3. Locate and check the operation of the ON/OFF starter. 4. Check that all safety guards are in working order. 5. Check the operation of the work vice. 6. Check coolant delivery system to allow for sufficient flow of coolant. 7. Faulty equipment must not be used. Immediately report suspect equipment. • OPERATIONAL SAFETY CHECKS 1. Ensure that the work piece is securely held in the work vice. 2. Support overhanging work and signpost if it presents a hazard. 3. Never leave the machine running unattended. 4. Attention must be paid to unusual noises during the sawing process. 5. Never force the saw into the work piece. Use a slow and even feed rate. 6. Before making adjustments or before cleaning swarf accumulations switch off and bring the machine to a complete standstill. 7. Immediately absorb any coolant spills. • HOUSEKEEPING 1. Switch off the machine. 2. Leave the machine in a safe, clean and tidy state. • POTENTIAL HAZARDS 1. Possible skin irritation from coolants 2. Eye injuries 3. Sharp edges and burrs - metal splinters 4. Noise • FORBIDDEN 1. Attempting to cut very small items Attempting to cut materials other than metal <p>Note: Any other relevant points can be considered.</p>		<p>01 mark (any two point)</p> <p>01 mark (any two point)</p> <p>02 mark</p>	04

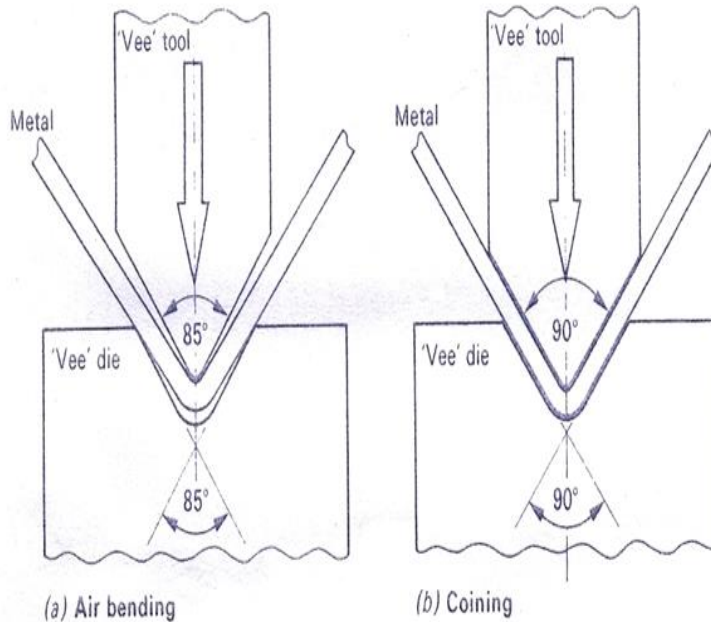


1. (B)	Attempt any <u>One</u> of the following	1x6mark	06
a.	<p>Flame Cutting Procedure: The procedure used for lighting a welding torch is adopted when lighting a cutting torch, but with some difference. The fuel gas regulator is set to the correct working pressure in the normal way and the oxygen regulator is set to the correct working pressure with the cutting oxygen valve on the torch in the open position.</p> <p>--- The fuel gas is lit and the flame adjusted, until it ceases to smoke.</p> <p>--- The heating oxygen valve is then opened and adjusted (similar to a neutral flame setting) until there is a series of nicely defined white inner cones in the flame (in the case of the multi-port type nozzle) or a short white conical ring, if the nozzle is of the annular port type.</p> <p>--- The cutting oxygen valve is then opened at this stage and the flame readjusted to a neutral condition. The oxygen cutting valve is then closed and the torch is ready for use.</p> <p>Application of flame cutting by hand:</p> <ol style="list-style-type: none"> 1) It is used to cut many layers of thin sheets also known as stack cutting to reduce the cost and time of production effectively 2) Flame cutting is used to groove weld joint metal designs and to prepare the edges of metal plates. 3) It can be used to cut risers, rivets and gates from castings. 4) Flame cutting is also used for salvage work and to pierce slots and holes of different sizes in steel plates. 5) Also used to cut work pieces of small sizes from large metal plates for further usage in production. 	<p>04 mark</p> <p>02mark (any two points)</p>	<p>06</p>
b.	<p>The elastic recovery of shape of the job in the bent zone on removal of the bending forces is known as 'spring back'. The methods of compensating are as shown below.</p> <p>• On a folding machine: The clamping beam on a folding machine is specially designed to compensate for spring back. This is illustrated in the figures shown below.</p>	<p>01 mark</p> <p>05 mark (any one method)</p>	<p>06</p>



OR

- On a press-brake, or a V-tool in a fly press: In this there are two methods of reducing springback as shown in the figures below.



Air bending --- This allows partial bending and various angles to be bent by three point loading. The three points are the two edges of the V-die (bottom tool) and the nose of the V-punch (top tool). During air bending, the sheet or plate retains its elasticity. In this case the bending angle must be over-closed to compensate for the springback of the material after removal. The bending tools are designed accordingly, both the top and bottom V's have an included angle of less than 90. In general, the angle of these tools is 85.

Advantages in air bending:

- 1) Less power required to bend the material.
- 2) Ability to bend heavy sheets and plates.
- 3) Ability to form various angles with the same tooling.

Disadvantages in air bending:

- 1) Inaccuracy in angle bends.

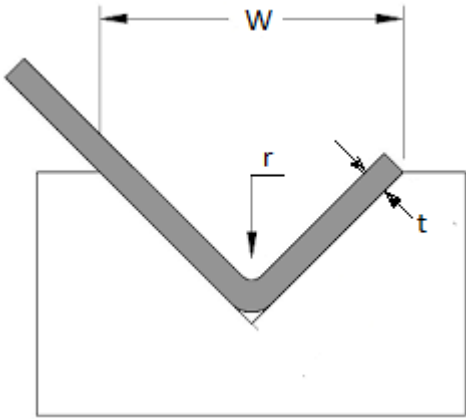
Coining --- This type of bending can be compared with a deep-drawing operation. The nose of the V-tool crushes the natural air bending radius on the inside of the bend. This compression removes the elasticity of the sheet or plate. This results in the bend retaining the exact angles of the bending tools. Both tools have an included angle of 90.

Advantages in coining:

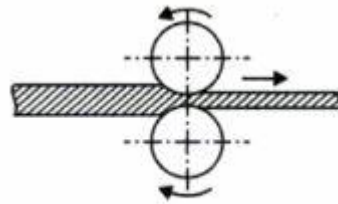
- 1) High angular accuracy in angle bends.

Disadvantages in coining:

- 1) More power required to bend the material.
- 2) Inability to bend heavy sheets and plates.
- 3) Inability to form various angles with the same tooling.

2.	Attempt any <u>Two</u> of the following	2x08mark	16
a.	<div data-bbox="488 268 951 684" data-label="Image">  <p>The diagram shows a V-shaped die used for bending sheet metal. The width of the V is labeled 'W', the thickness of the sheet metal is labeled 't', and the radius of the bend is labeled 'r'.</p> </div> <p>Die ratio: It is the ratio between the width of the vee and the thickness of the sheet metal.</p> <p>The dimensional specification of a press brake are:</p> <ul style="list-style-type: none"> • Capacity in tonnage • Downstroking or upstroking • Bed top width • Shut height • Bend depth • Depth – front-to-back horizontal dimensions • Height – that indicates its vertical dimensions • Overall length – The total length of the ram measured horizontally in feet or meters • Stroke height • Throat depth <p>Advantages of power press:</p> <ol style="list-style-type: none"> 1) Full power stroke is available. 2) Operating cost is lower. 3) Since less mechanical press other than ram, it has less maintenance. 4) Output production capacity is higher. 5) Precision control over work. <p>Dis advantages:</p> <ol style="list-style-type: none"> 1) Leakage of oil. 2) Energy consumption is higher. 3) Operational speed is less. 	<p>02 mark</p> <p>02 mark</p> <p>02 mark (any two points)</p> <p>02 mark (any two points)</p>	<p>08</p>

b. Arrangements of rolls:



(a) Two-high

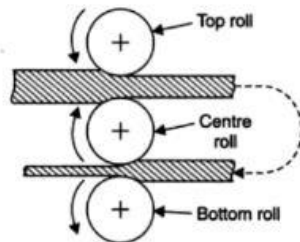


Fig. 3.5. Three-high rolls.

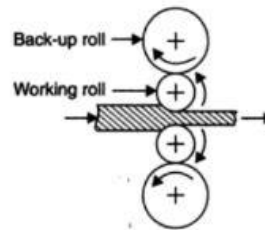


Fig. 3.6. Four-high rolls.

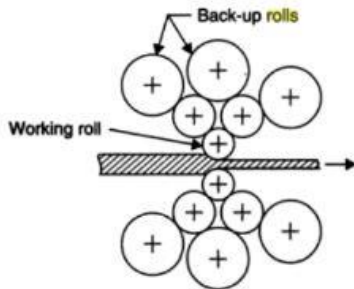


Fig. 3.7. Cluster roll.

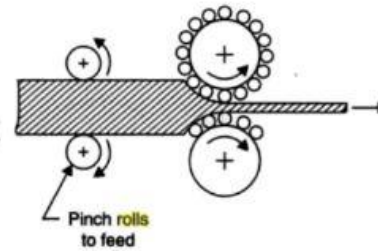
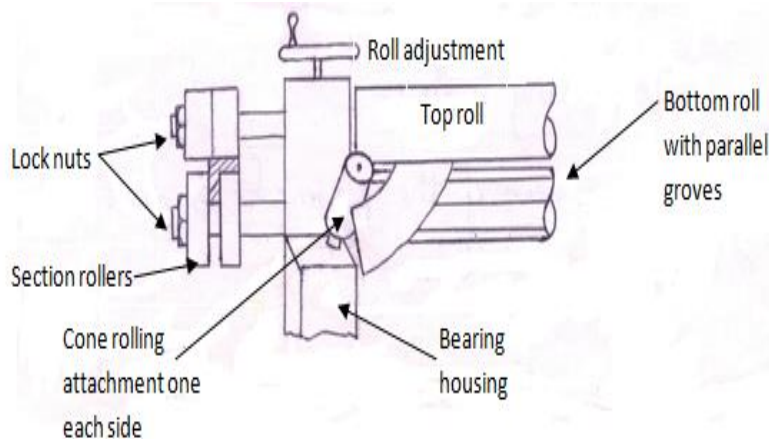


Fig. 3.8. Planetary mill.

Cone Rolling:

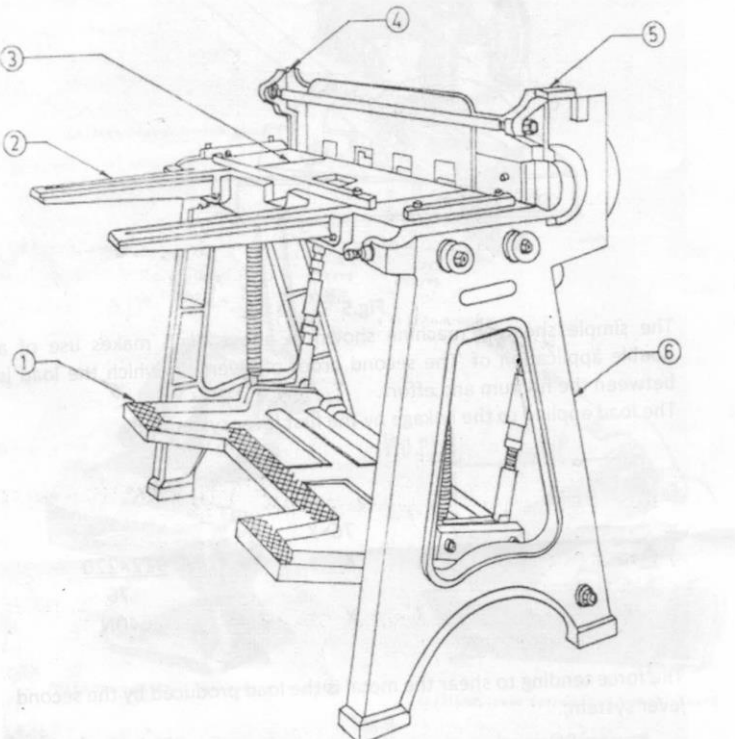


A certain amount of cone rolling may be carried out on both hand and power operated rolls. To enable this to be done provision must be made to adjust the curving roll to a suitable angle in the horizontal plane to the

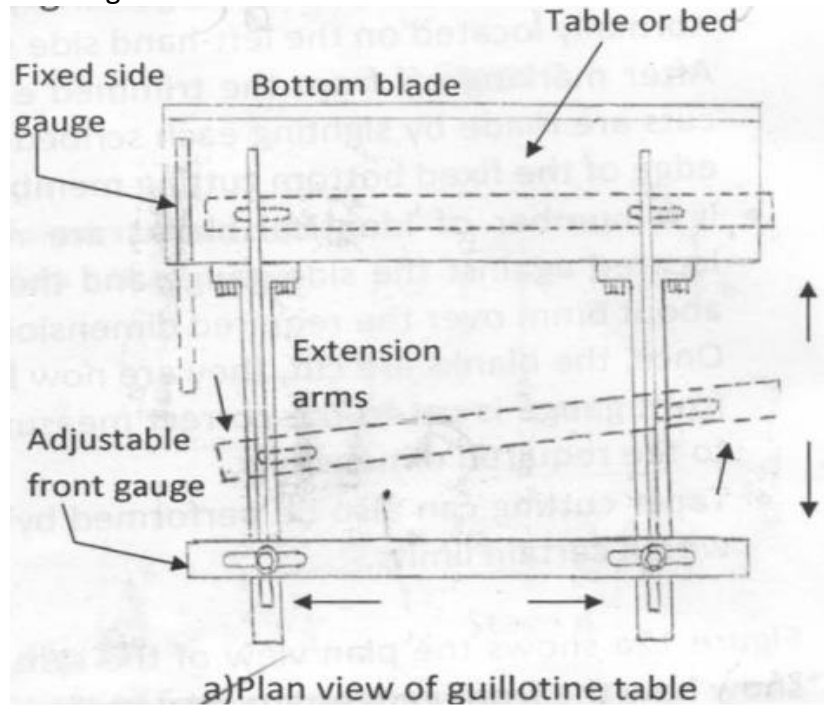
04 mark
for
arrangement

08

04 mark
for cone
roll
(02 mark
for
diagram)

3	Attempt any <u>Two</u> of the following	2x8mark	16
a.	<p>Treadle Guillotine Machine:</p>  <p>1- Foot pedal, 2- Rest for sheet, 3- Table, 4- Slide holding blade, 5- Hold down attachment, 6- Side wall</p> <p>The treadle operated guillotine shearing machine is economical to be use in small metal shop for cutting sheets. The sheet up to 1.5mm(16swg)thick are cut into strips. The blade has 4 working edges which provided 4 times cutting life of the blade.</p>	<p>02 mark for diagram</p> <p>02 mark</p>	08

Working:



When power is transmitted to the blade it starts moving downward. A sufficient clearance is provided between the bottom and top blade. The top blade is inclined at a considerable angle called as shear angle which is approximately 5° with horizontal because of which area under shear is greatly reduced and consequently the force required to shear the material is also considerably reduced

Shear Force= Area under shear X Shear strength of material

A typical guillotine machine is provided with fixed side gauge extension arm, adjustable front gauge, table or bed and bottom blade as shown in figure. The sheet to be cut is held against fixed side gauge and the front and back gauges are adjusted according to the required dimension of sheet to be cut.

Safety Precaution:

- 1) Use hand gloves, suits, etc. while working on the machine.
- 2) Use helmets and goggles.
- 3) All gadgets like watches etc. have to be removed while operating.
- 4) All the norms have to be carried out before start of the machine.
- 5) The machine has to be kept clean to avoid any safety issues.

02 mark

02 mark

b.i.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Sr.</th> <th style="width: 35%;">Flame Cutting</th> <th style="width: 35%;">Shearing</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>It is process where the cutting of the metal takes place flame produced due to acetylene and oxygen</td> <td>It is process where the cutting of metal is due to shear force.</td> </tr> <tr> <td>2</td> <td>It distorts the sheet metal</td> <td>Less distortion</td> </tr> <tr> <td>3</td> <td>Properties of metal may change</td> <td>There is no change in properties only stress are added.</td> </tr> <tr> <td>4</td> <td>It takes less time</td> <td>It takes more time</td> </tr> <tr> <td>5</td> <td>It is costly</td> <td>It is less costly.</td> </tr> </tbody> </table>	Sr.	Flame Cutting	Shearing	1	It is process where the cutting of the metal takes place flame produced due to acetylene and oxygen	It is process where the cutting of metal is due to shear force.	2	It distorts the sheet metal	Less distortion	3	Properties of metal may change	There is no change in properties only stress are added.	4	It takes less time	It takes more time	5	It is costly	It is less costly.	04 mark (any four)	04
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b.ii.	<p>Gouging: It is a process where metal is removed by the help of flame cutter. It uses special apparatus so that it could be cut as shown in fig. it should be noted that while using the gouging process for removing weld from a plate care should be taken that the thickness of the plate should be greater than that of weld otherwise the plate will get burned.</p>	02 marks	04																		



		<p>02marks</p>	
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c.

Bend allowances for sheet metals:

T = Thickness of metal

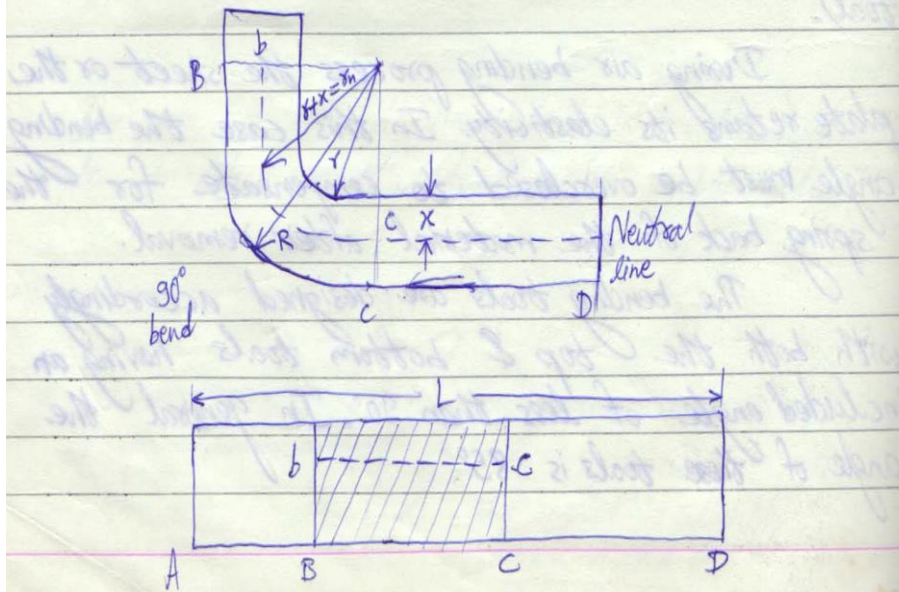
R = Outside radius of bend.

r = Inside radius of bend.

x = Distance of the neutral from compression or inner side of bend.

$r+x = r_n$ = radius for neutral line.

b_c = Arc length of neutral line.



04 mark

08

∴ True length, $L = AB + CD + \text{Calculated length bc.}$
or $L = AB + CD + \text{Bend allowance bc (shaded position)}$

When sheet metals are bend through angles of 90° , the material on the outside surfaces become stretched while than on the inside surface ~~become~~ become compressed. Because there is a slight difference between the amount of compressive strain and the amount of tensile strength. The neutral line lies in the position nearer the inside of the bend.

The neutral line is an imaginary curve somewhere inside the metal in the bend. It does not undergo any change in length during the bending process.

For the purpose of calculating the bend allowance the neutral line is therefore regarded as an arc of a circle whose radius is equal to the sum of the inside bend radius plus the distance of the neutral line from inside of the bend. The result above which gives the true length highlights the importance of the neutral line.

The Precise position of the neutral line inside the bend depends on the following factors:

- 1) The properties of the material.
- 2) The thickness of the material.
- 3) The inside radius of the bend.

Table 1 :- Neutral line data for bending sheet metals.

02 mark

Application of Bend allowances:-



s = length of arc.
 θ = subtended angle.
 r = bend radius.

$$\sin \theta = \frac{s}{r}$$

If θ = very small angle then,

$$\sin \theta = \theta$$

$$\text{arc } s = \text{line } s$$

$$\therefore s = r\theta$$

Now, consider a subtended angle θ which is significant in its value.

For $\theta = 360^\circ$, length of arc = $2\pi r_n$
 \therefore For $\theta = 90^\circ$, length of arc = ?

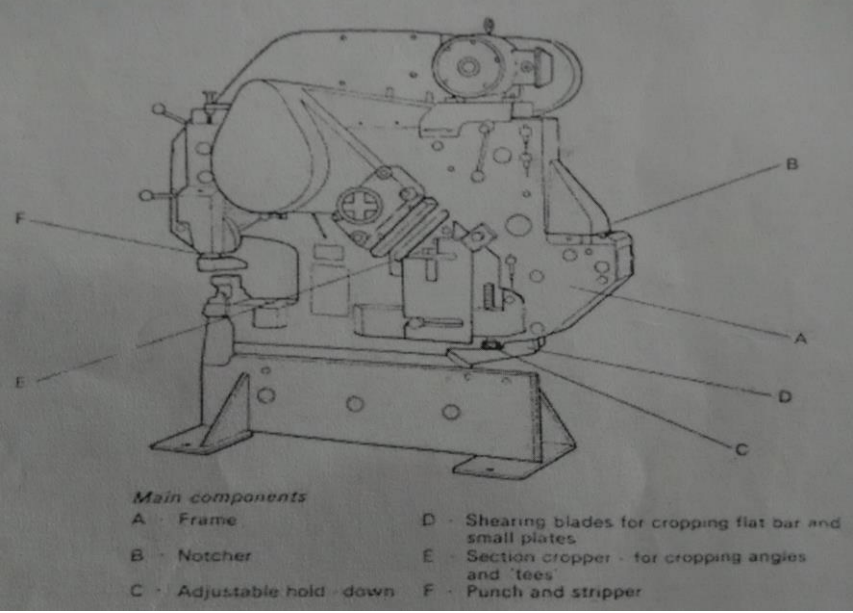
Cross multiply we have.

$$\begin{aligned} \text{length of arc} &= \frac{2\pi r_n \times 90}{360} \\ &= \frac{2\pi}{360} \times 90 \times r_n \\ &= 0.0175 \times 90 \times r_n \end{aligned}$$

Steps in folding: The three main steps in folding are;

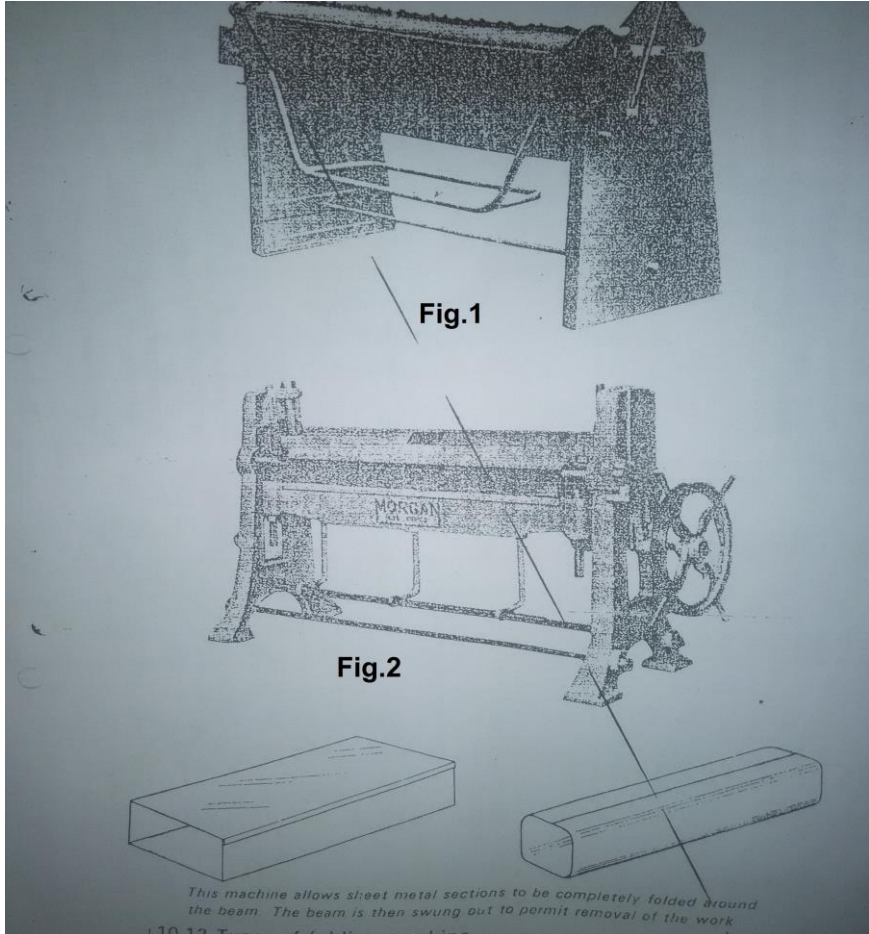
- Clamping --- In clamping, the amount of lift of the clamping beam is important. It should be sufficient to allow the fitting and use of special clamping blades, or to give adequate clearance for previous folds.
- Folding --- Care must be taken to see that the folding beam will clear the work, particularly when making second or third folds. Some folding machines are designed to fold radii above the minimum, either by the fitting of a radius bar or by adjustment of the folding beam.
- Removal of the work --- Care must be taken in folding to ensure that the work may be easily removed on completion of the final bend. The sequence of folding must be carefully studied. The lift of the clamping beam is important here. Some folding machines, known as 'universal folders' have a swing beam. The work may be completely folded around this beam, which is then swung out to allow removal of the work.

02mark

4. (A)	Attempt any <u>Three</u> of the following	3x4mark	12						
a.	<p>Factors influencing the quality of cut: The success of the flame cutting operation depends upon;</p> <ul style="list-style-type: none"> • Selecting the correct size of cutter nozzle for the thickness of the material being cut. • Operating the cutting torch at the correct oxygen pressure. • Moving the cutting torch at the correct cutting speed. • Maintaining the nozzle at the correct distance from the plate surface. <p>(If the torch is adjusted and manipulated correctly, a smooth narrow cut, termed the 'kerf', is produced).</p>	04 mark	04						
b.	<p>The difference between 'folding' and 'bending' is so slight that they are both carried out with the same purpose in view which is to deflect the metal from one flat plane to another so that it stays there permanently.</p> <p>If the deflection is sharp and the radius small, the metal is said to be folded .e.g. a single fold or hem.</p> <p>Should the curvature be large and the deflection cover a large area, it is called bending .e.g. the rolling of a hollow body, such as a cylinder.</p> <p>Folding or bending involves the deformation of a material along a straight line in two dimensions only.</p>	04 mark	04						
c.	 <p><i>Main components</i></p> <table border="0"> <tr> <td>A - Frame</td> <td>D - Shearing blades for cropping flat bar and small plates</td> </tr> <tr> <td>B - Notcher</td> <td>E - Section cropper - for cropping angles and tees</td> </tr> <tr> <td>C - Adjustable hold-down</td> <td>F - Punch and stripper</td> </tr> </table>	A - Frame	D - Shearing blades for cropping flat bar and small plates	B - Notcher	E - Section cropper - for cropping angles and tees	C - Adjustable hold-down	F - Punch and stripper	04 mark	04
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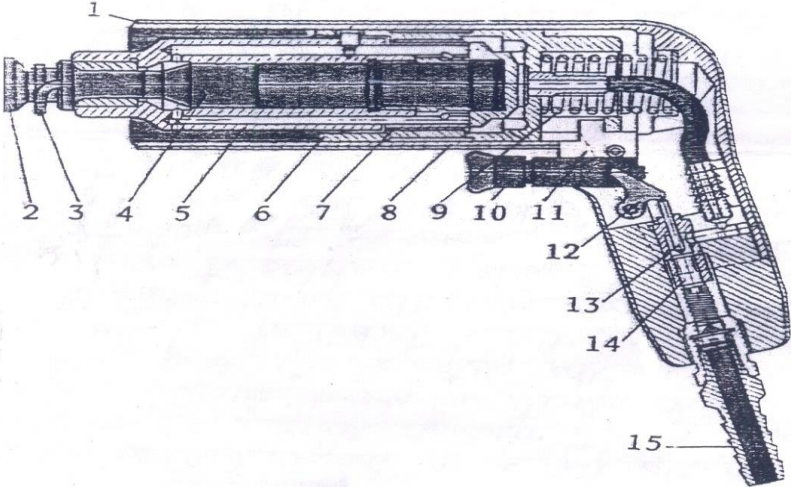
d.	<p>Advantages of power hack sawing:</p> <ul style="list-style-type: none">• A major advantage is the relatively low capital investment required.• Easy to set up and simple to operate.• Unskilled or semi-skilled help can be used and one operator can often attend two or more machines.• Tooling costs are low and the blades are inexpensive enough to make it economically feasible to throw them away when they become worn.• Tendency for the blades to twist or deflect is minimal.• Maintenance costs are low because of the simple design and operation.• Versatility is another important advantage. The machines can handle most cutting requirements including practically all materials, a wide range of stock sizes within their capacities and any cut-off length.• Accuracies maintained and finishes produced range from fair to good depending on the material being sawed. <p>Disadvantages of power hack sawing:</p> <ul style="list-style-type: none">• A major disadvantage is that the machine is slow.• The cutting action is non continuous, and only half of each reciprocating stroke is productive.• The reciprocating action of hack sawing prohibits the use of blade supports close to the area of cutting. This may cause bowing of the blade and some inaccuracy. Therefore blades are made thicker, thus requiring more power and producing more chips.• Power hack sawing is essentially a roughing operation and at least 0.05mm should be left on cut surfaces for finishing.• Blade wear is uneven because only part of the blade is used for cutting since the arm holding the blade obstructs the use of blade ends. <p>The necessity for stopping and reversing the direction of blade travel at the end of each stroke causes the cutting speed to vary, thus reducing efficiency.</p>	<p>02 mark (any four points)</p> <p>02 mark (any four points)</p>	<p>04</p>
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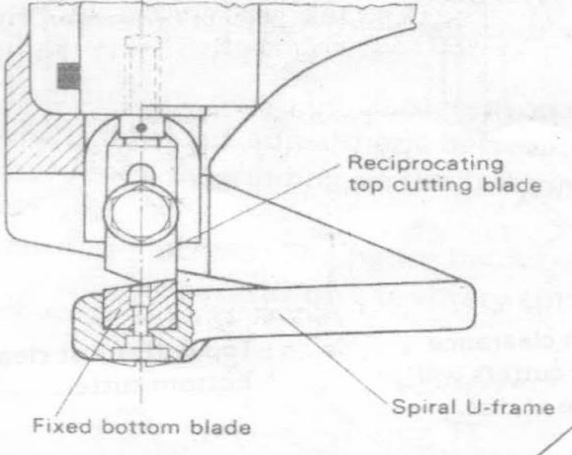
4.(B)	Attempt any <u>One</u> of the following	1x06mark	06
a.	<p>Technique of cutting a round bar --- When a round bar is to be flame cut, it is advisable to make a nick with a cold chisel at the point where the cut is to start. This enables the flame cutting to be started more easily.</p> <p>Once the cut is started, the cutting torch should be moved steadily and at a uniform speed, with the small cone of the pre-heating flame just clear off the work surface.</p> <p>There must be no vibration of the cutting head as such movements will result in a ragged cut and in some cases, the cut being halted.</p>	06mark	06
b.	<p>Folding machines are differentiated by the way of operation or process:</p> <ol style="list-style-type: none"> 1. Manual folding machine 2. Power operated machine <div style="text-align: center;">  <p>Fig.1</p> <p>Fig.2</p> <p><i>This machine allows sheet metal sections to be completely folded around the beam. The beam is then swung out to permit removal of the work</i></p> </div>	02 mark	06

04 marks
for any
one
method
(02 mark
for
diagram)



	<p>Manual Folding machine: Manual folding machine (fig.1) is where the force on the sheet metal is applied by hand. The lever is lifted so that the mechanism tends to lift the folding blade and applying force on the sheet metal.</p> <p style="text-align: center;"><u>OR</u></p> <p>Power Operated machine: This type (fig.1) is where the force on the sheet metal is applied by help of drives which are in turn rotated by motors or hand wheel. The lever is lifted so that the mechanism tends to lift the folding blade and applying force on the sheet metal. The specialty of this type is that thick sheet metal can be folded.</p>		
5.	Attempt any <u>Two</u> of the following	2x08mark	16
a.	<p>Methods of riveting:</p> <ol style="list-style-type: none">1. Hand operated Rivet2. Power rivet <p>Power Rivet: Large parts are mainly riveted with pneumatic hand hammers and to a lesser extent with electric hammers. As seen from the figure below, when trigger (10) is depressed with the finger, it acts through lever (12) on the plunger (13) which admits compressed air into valve (14). As this takes place, the piston shoots down and heads the rivet and the distribution valve opens a port for letting the air into the lower chamber of the cylinder, under the piston, making it move upwards. Spring (9) serves for damping the piston's back blow and thus protects the operator from harmful effect of vibrations and spring (3) prevents the die from falling out.</p> <p>In operation, the pneumatic hammer is held by the handle with the right hand and the trigger is depressed with the forefinger. The left hand grips the tool by the barrel or the die to keep the latter on the rivet head.</p> <p>Riveting with a pneumatic hammer is done by two workers; the riveter operates the hammer and the holder-on holds the dolly bar.</p>	01 mark 05 mark (02mark for diagram)	08

	<p><i>Pneumatic riveting hammer</i></p> <p>1 - body; 2 - riveting die; 3, 9 - spring; 4 - setting punch; 5 - cylinder; 6 - sleeve; 7 - distribution valve;</p> <p>8 - cover; 10 - trigger; 11 - handle; 12 - lever; 13 - plunger; 14 - starting valve; 15 - nipple</p>  <p>Allowances for Riveting:</p> <ol style="list-style-type: none"> 1. Clearance: Diameter of rivet X 0.05 2. Hole diameter 3. Pitch: distance between two holes 4. Length of shank 	02 mark	
<p>b.i.</p>	<p>Blanking: It is the operation of cutting of flat sheet to the desired shape. The metal punched out is the required product and the plate with the hole left on the die goes as waste. The die governs the size of the blank produced and clearance is left on the punch.</p> <p>Piercing: It is the operation of production of a hole in a sheet metal by the punch and die. The material punched out to form the hole constitutes the waste. The punch governs the size of the hole (punch point diameter is less than or equal to material thickness) and clearance is provided on die.</p> <p>The pressure required to produce a blank is therefore a measure of the combined tensile, shear and perhaps compressive strengths of the materials. For practical purposes, it is usual to assume pure shear area, such that:</p> <p>Blanking pressure = Ultimate shear stress of material × Area being sheared</p>	03 mark	04
		01 mark	

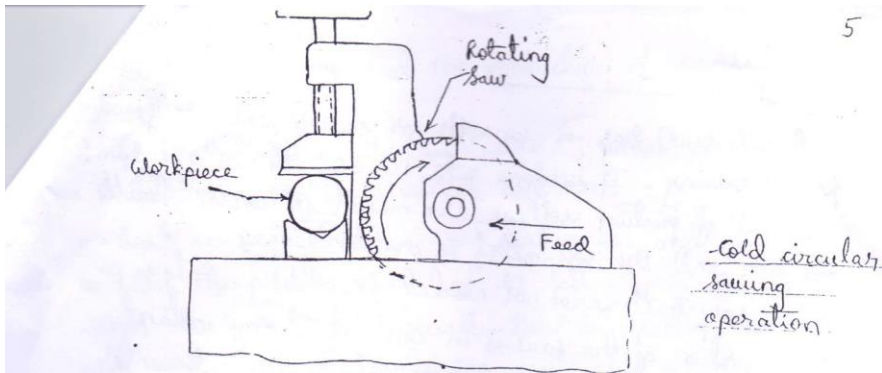
	<p>v) The ram speed control on a hydraulic press allows the best adjustments of the material being worked.</p> <p>vi) The tonnage of a hydraulic press brake is a function of the size of its cylinders, pump and circuit capacity. The hydraulic press brake's fixed tonnage cannot be surpassed so the brake can be bottomed at full tonnage repeatedly without risk. This is its advantage over the mechanical press brakes.</p> <p>vii) The hydraulic driven ram will stop when it reaches the selected tonnage. It can be withdrawn from any point on the job.</p> <p>viii) It is possible for the ram to be positioned within a thousandth of an inch. A job requiring repetition can be set up to produce identical parts in minutes. This capability is not available with mechanical press brakes.</p> <p>The hydraulic press brakes delivers full rated power throughout its stroke and has a longer stroke than a mechanical brake which is limited in stroke length by its crankshaft design.</p>		
<p>c.</p>	<p>Shear Type Nibbler:</p>  <p>The shear type nibbler: This portable power tool is used for rapid and accurate straight line or curved cutting of material up to 4.5mm thickness. It is basically a short stroke power shear fitted with a rapidly reciprocating cutting blade, so that each stroke makes a cut approximately 3mm in length.</p> <p>The shear type nibbler is fitted with a pair of very narrow flat blades, one of which is usually fixed and the other moving to and from the fixed blade at fairly high speeds. Generally these blades have a very pronounced Rake to permit piercing of the material for internal cutting, and since the blades are</p>	<p>02 mark for diagram</p> <p>04mark</p>	<p>08</p>



	<p>so narrow, the sheet material can be easily maneuvered during cutting. The top blade is fixed to the moving member or ram and the bottom blade on a spiral extension or 'U' frame. This extension is shaped like the body of a 'throatless shear', to part the material after cutting. There is usually provision for vertical adjustment to allow for re-sharpening of the blade by grinding and an adjustment behind the bottom blade to allow for setting the cutting clearance. figure above shows details of the 'shear type nibbler'. The spiral U-frame is designed to assist in parting the metal after it has been sheared.</p> <p>Advantages:</p> <ol style="list-style-type: none">1. Very much easy to operate.2. Intricate shape can be cut easily.3. Operations can be done very fast.			02 mark	
6.	Attempt any <u>Four</u> of the following			4x04mark	16
a.	Sr.no	Parallel Shaft	Inclined Shaft	04 mark	04
	1	Parallel shaft machines are generally bench machine.	Inclined shaft machine are generally throat less machine.		
	2.	They are generally fixed.	They are movable type of machine.		
	3.	Less angle of cut as compared to inclined shaft.	More angle of cut is available.		
	4.	Irregular shapes with less intricate shape only possible.	More intricate and irregular shapes are possible.		

b.

1. * Circular Saw Machines :- Circular saws are of three kinds, viz. a cold saw; a hot saw & abrasive saw.
— A cold saw is commonly fed horizontally through a workpiece, particularly for heavy work as shown in the figure below.

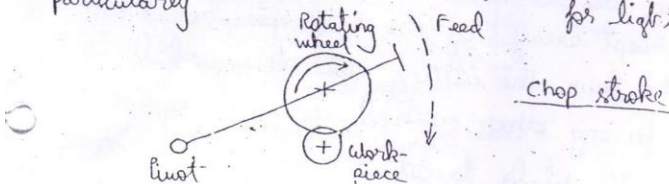


It is a continuous and fast method of cutting-off and leaves a smooth and accurate milled surface with few or no burrs, which may save work in subsequent operations.

A 150 mm dia. steel bar can easily be cut-off in a minute.

Production cold sawing eqpt. is expensive. An automatic machine with a 250 mm dia. capacity in steel and a 7.5 kW motor costs about \$50,000.

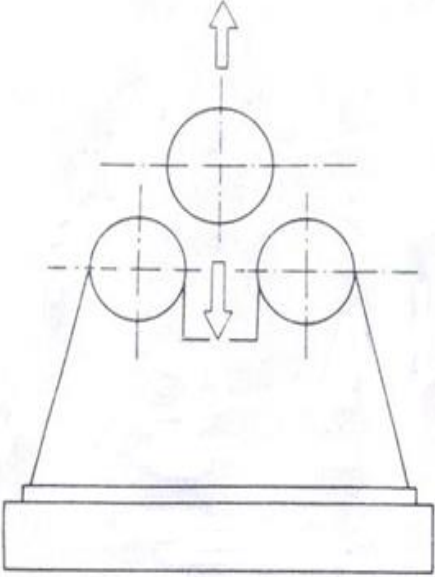
Other machines may feed the saw vertically or around a pivot with a chop stroke as shown in the fig. below, particularly for light work.



Workpieces are usually clamped in a vise, one or more at a time. The stock is pushed against a stock stop and clamped, and the saw is fed by hand on manual model machines. Other models are semi and fully automatic in operation. Some also chamfer or center the pieces that are cut-off.

04 mark
(01 mark
for
drawing)

04

<p>c.</p>	<p>Pyramid type rolling machine:</p>  <p style="text-align: right;"><i>(a) Pyramid-type rolls (standard design)</i></p> <p>Pyramid-type rolls, as the name suggests have three rolls arranged in pyramid fashion as shown. Most plate rolling machines are provided with longitudinal grooves along the lower rolls to assist in gripping the plate. These grooves are useful for initial alignment of the plate.</p>	<p>04 mark (02 mark for diagram)</p>	<p>04</p>
<p>d.</p>	<p>Common rivets form:</p> <ul style="list-style-type: none"> • Tinmans rivet • Pop rivet • Knob head • Blind rivet • Semi tubular or full tubular • Bifurcated Rivet 	<p>01 mark</p>	<p>04</p>

				03 mark (any two rivet)															
e.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;">Parameters</td> <td style="padding: 2px;">Bolting</td> <td style="padding: 2px;">Riveting</td> </tr> <tr> <td style="padding: 2px;">Cost</td> <td style="padding: 2px;">Low cost</td> <td style="padding: 2px;">High cost</td> </tr> <tr> <td style="padding: 2px;">Reliability</td> <td style="padding: 2px;">Less</td> <td style="padding: 2px;">High</td> </tr> <tr> <td style="padding: 2px;">Labor skills</td> <td style="padding: 2px;">Unskilled to semi - skilled</td> <td style="padding: 2px;">Semi – skilled to skilled</td> </tr> <tr> <td style="padding: 2px;">Joint strength</td> <td style="padding: 2px;">Low (fluctuating loads)</td> <td style="padding: 2px;">High (fluctuating loads)</td> </tr> </table>	Parameters	Bolting	Riveting	Cost	Low cost	High cost	Reliability	Less	High	Labor skills	Unskilled to semi - skilled	Semi – skilled to skilled	Joint strength	Low (fluctuating loads)	High (fluctuating loads)		04 mark	04
Parameters	Bolting	Riveting																	
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f.	<p>The factors affecting setting of guillotine machine:</p> <ul style="list-style-type: none"> ● The fixed side gauge of sheet: It is used for positioning the material. To square off two adjacent sides of a sheet a trim cut is made. The second adjacent cut is then made after resting the cut edge. ● If two identical sheets is to be made then the back gauge is fixed with an addition of 6mm to the original dimensions. ● After the back gauge is fixed then the front gauge can be fixed. ● Taper cutting operations can be done but by tilting the front guide at an angle. 			04 mark	04														