LABORATORY MANUAL

ON

MECHANICAL
ENGINEERING
LAB-I

3rd SEMESTER,

DEPT. OF MECHANICAL ENGG.

GOVERNMENT POLYTECHNIC SONEPUR

PREPARED BY:

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EXPERIMENT NO. 1

1. OBJECTIVES:

Determine end reactions in a simply supported beam using parallel force apparatus.

2. APPARATUS:

- Simply Supported Beam apparatus
- Meter Rod
- Hanger
- Weight Balance
- Loads

3. PROCEDURE:

A) Take the simply supported beam apparatus and clean it properly.

B) Take two spring balance and attached their one ends to the beam.

C) Tie the other end to the beam supported apparatus.

D) Measure the distance L between two supported.\

E) Tie two hangers with the beam at some distance L_1, L_2 respectively.

F) Add weight to the hangers and note the reactions from two spring balances.

G) Repeat the experiment by adding different weights to the hangers.

H) Notes the reaction for all of them.

i) Now calculate the theoretical reaction forces from the following equation.

$R_A+R_B=W_1+W_2$ and $R_B= W_1L_1+ W_2L_2$

from these equation ,we can calculate the theoretical values of R_A & R_B

J) Calculating these experimental and theoretical values

K) Determine the percentage of errors in these values.

4)OBSERVATION

LOADS(Kg)		LENTH(Cm)		Experimental reaction(N)		Theoretical reaction(N)		Error		mean
W_1	W_2	L_1	L_2	$R_A^{'}$	$R_B^{'}$	R_A	R_B	/ R_A	/ R_B	

Error for $A = \frac{R_A' - R_A}{R_A'}$

Error for $B = \frac{R_B' - R_B}{R_B'}$

CONCLUSION:-

From the above experiment we have successfully determine the reactions.

EXPERIMENT NO. 02

AIM OF THE EXPERIMENT:-

Determination of Young's Modulus usingSearl's Apparatus.

APPARATUS REQURIED:-

SL NO.	NAME OF THE APPARATUS
01	Searl's apparatus
02	Verniercaliper
03	Steel rule
04	Copper wire
05	Balancing weight
06	Weight pan
07	Plier

THEORY:-

STRESS:-

It is defined as the ratio between the load and cross-sectional area of the given specimen.

Mathematically,

Stress=load/area,σ= (P/A)

Unit of stress is N/M^2 or KN/M^2

STRAIN:-

It is defined as the ratio between the change in the length to its original length of the given specimen.

Mathematically,

Strain = change in length/original length

e= $\delta l/l$, It has nounit.

YOUNGS MODULUS:-

It is defined as the ratio between stress to strain.

Mathematically,

Young'smodulus = stress/strain= $E = \sigma/e$

Its unit is KN/M^2 or N/M^2.

Technical Specification:

Diameter of copper wire (d)= m^2

Cross-sectional area of the specimen (A)=$(\prod/4)xD^2$ = ...M^2

Original Length of copper wire(L)= m

PROCEDURE:-

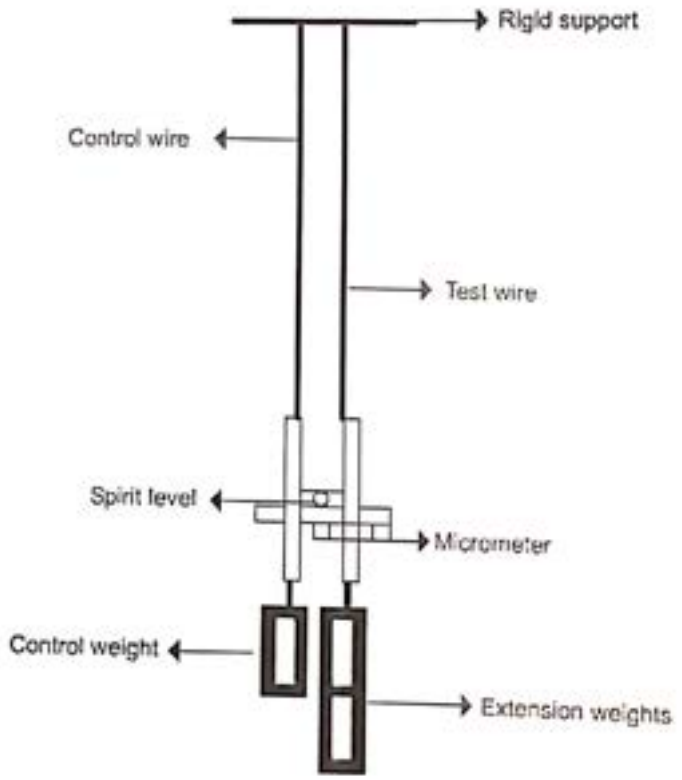
- Take two copper wires.
- Hang the searls apparatus by the two copper wires of which one wire is fixed wire and another is testing wire.
- Now measure the diameter and length of the wire.
- Then set the weight pan in the testing side.
- Then give some load in the load pan. The wire will elongate.
- Now write down the load applied and the change in length in the observation table.
- Then gradually increase the loads and take at least five readings.

OBSERVATION & CALCULATION TABLE:-

SL.NO	LOAD APPLIED(P) Kg	STRESS (P/A)	CHANGE IN LENGTH(ΔL) m	STRAIN (ΔL/L)	YOOUNG'S MODULUS(σ/e)
1					
2					
3					

CONCLUSION:-

From the above experiment we have successfully determine the young's modulus by using the searl's apparatus.



SEARL'S APPARATUS

EXPERIMENT NO:-03

AIM OF THE EXPERIMENT:-

Determination of torsional rigidity of the shaft by using torsion testing machine.

APPARATUS REQUIRED:-

SL.NO	NAME OF THE APPARATUS	QUANTITY
01	Torsion testing machine	01
02	Mild steel specimen	01
03	Steel rule	01
04	Verniercalliper	01

THEORY:-

- A torsion test is a quite instrumental in determining the value of modulus of rigidity (ratio of sear stress to shear strain) of a metallic specimen.
- The modulus of rigidity can be found out through observations, made during the experiment by using the torsion equation.
- Torque is defined as the product of twisting force to the distance between the point of application of the force and the axis of the shaft.
- The torsion equation is- $T/J=C\theta/L$.

So ,$C=TL/J\theta$

Where,

T=Torque applied.

J=Polar moment of inertia.= $/_{32}XD^4$

D= Diameter of specimen.

C=Modulus of rigidity.

θ=Angle of twist.

L=Gauge length of the specimen in m.

PROCEDURE:-

- Select the driving dogs to suit the size of the specimen and clamp it in the machine by adjusting the length of the specimen by means of a sliding spindle.

- Measure the diameter of the specimen at about three places and take the average values.
- Choose the appropriate range by capacity change lever.
- Set the maximum load pointer to zero.
- Set the protractor to zero for convenience.
- Carry out straining by rotating the hand lever in either direction.
- Load the machine in suitable increments, observing and recording strain gauge.

OBSERVATION TABLE:-

SL.NO	TORQUE APPLIED in (Kg-m)	ANGLE (θ) in degree	T_{mean}(kgm)	θ_{mean}(degree)
1				
2				
3				
4				

CALCULATION:-

Polar moment of inertia (J) =$(\pi/32)xD^4$ mm^4

θ_{mean} =.....=.....x$(\pi/180)$=.....rad

T_{mean} =.....=.....x9.81=.....N-m

Modulus of rigidity(C)=TL/Jθ =.....N/m^2

CONCLUSION:-

From the above experiment we have successfully determine the modulus of rigidity of mild steel specimen by using torsion testing machine.

EXPERIMENT NO:-04

AIM OF THE EXPERIMENT:-

Determination of Salient points(Young's Modulus, Yield Point, Fracture point from stress – strain curve using Universal Testing Machine(UTM).

APPARATUS REQUIRED:-

SL.NO	NAME OF THE APPARATUS	QUANTITY
01	Universal testing machine	01
02	Mild steel specimen	01
03	Vernier calliper	01
04	Steel rule	01

THEORY:-

- The result obtained by the tensile test are widely used in design of material for structures and others purposes.
- In this test the specimen pulled out at a constant rate by gradually increasing the axial pole till the rupture takes place.
- The tensile test for a ductile material is generally carried out with the help of UTM.
- The machine has two units ,one is control unit and another is release valve.
- Control unit is used for controlling the load applied and release valve is used for releasing the hydraulic pressure.
- The tensile test of a material is generally performed to determine –
    - Proportional limit
    - Elastic limit
    - Yield point
    - Ultimate point
    - Fracture point or breaking point

PROPERTIONAL LIMIT:-

We see from the above diagram that from point 'o' to 'A' is a straight line which represents that the stress is proportional to strain. Beyond point 'A',The curve isslightly deviated from the straight line. It is then obeys the hook's law hold up to 'A' and is known as proportional limit.

ELASTIC LIMIT:-

It may be noted that even if the load is increased beyond point 'A' up to point 'B' the material will regain its shape and size after the release of loadup to point B is known as elastic limit.

YIELD POINT:-

If the material is stretched beyond point 'B' the elastic stress will be reached i.e on the removal of the load ,the material will not be able recover its original shape and size .The point 'C' and 'D' are called upper yield and lower yield point respectively .The stress corresponding to yield point is known as yield stress.

ULTIMATE POINT:-

After the lower Yield point ,the specimen regains some strength and higher value of stress are required for higher strain.The stress goes on increasing till point 'E' is reached. At 'E' the stress which attainsits maximum values is known as ultimate tensile stress.

BREAKING POINT:-

After the specimen has reached to the ultimate stress the neck is formed which decreases the cross sectional area of the specimen. The stress is therefore reduced until the specimen breaks itself at point 'F'. The stress corresponding to point 'F' is known as breaking sress.

MATHEMATICALFORMULA USED:-

Stress =load/cross sectional area

$\sigma=P/A$

Its unit is N/M^2

Strain =change in length/original length

$e=\Delta l/l$

It is unit less.

Young 's modulus(E)=stress/strain= σ/e

Its unit is N/M^2

OBSERVATION TABLE:-

Sl no.	Load applied(P)	Change in length(Δl)	stress(P/A)	strain(Δl/l)	Young's modulus(σ/e)

CALCULATION:-

Area of specimen=$(\pi/4)xd^2$

=.....

Stress=P/A=.....

Strain=Δl/l=.....

Young's modulus=stress/strain=.....

CONCLUSION:-

From the above experiment we have successfully determine the young's modulus of mild steel specimen by using universal testing machine.

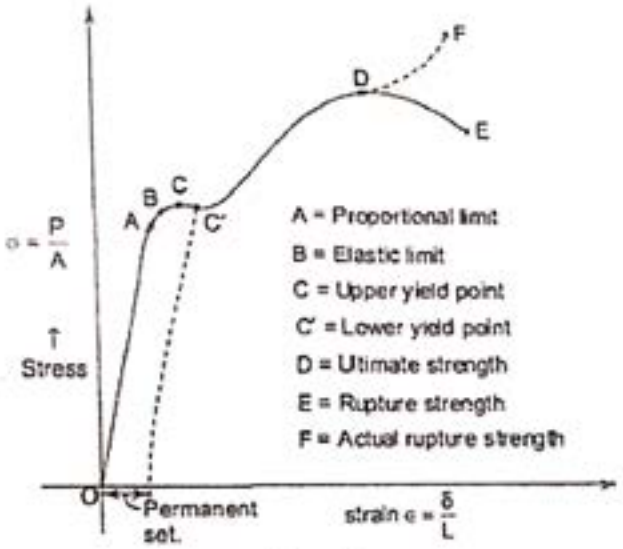


Fig. 2.2

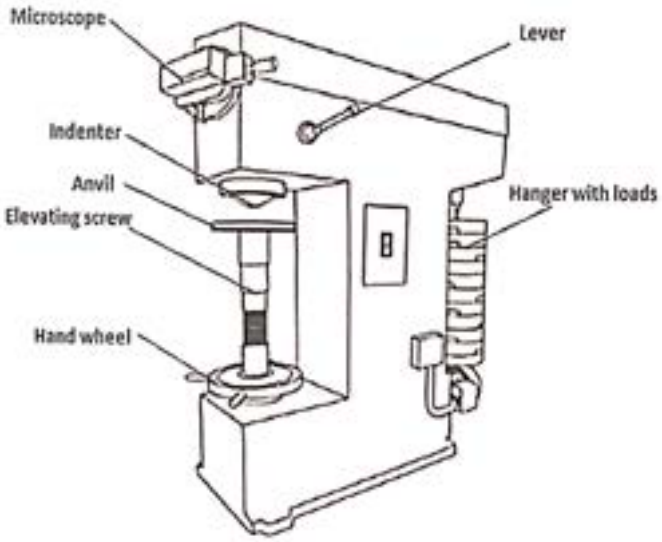
Conditions f-or $\epsilon = \frac{\delta}{L}$ to be constant.

Brinell Hardness Test

Aim :- To determine the indentation hardness of mild steel using Brinell Hardness Testing Machine.

Apparatus Required:- Brinell Testing Machine, hard mild steel etc.

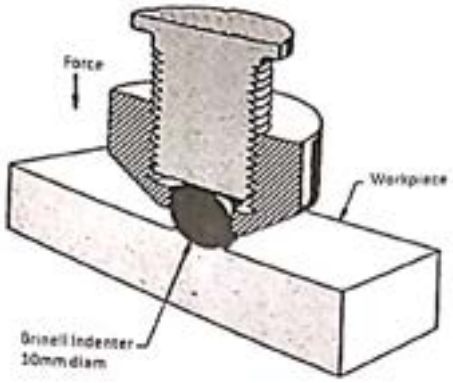
Diagram:-



Theory:-

Brinell hardness test is most commonly used to test materials that have a structure that is too rough or too coarse to be tested using other test methods, e.g., castings and forgings. In brinell testing machine the load is applied by a lever mounted on knife edges and carrying a hanger for suspending the required load. The supporting table for spacing the specimen can be raised or lowered by a steel screw by operating a large hand wheel. When testing, the load is applied and removed by hydraulic power controlled by a hand lever. The indenter used is a hardened steel ball which will have a diameter of 10mm, 5mm or 2.5mm. The reading microscopic has a 25-fold magnification. The gap between successive graduations of the scale is 0.5mm and a micrometer is arranged sideways, the eye piece of the reading microscope may be turned up by 90 degree so that the impressions of the ball can be measured in two perpendicular directions.

A well structured Brinell hardness number reveals the test conditions, i.e., "70 HB 10/500/30" which means that a Brinell Hardness of 70 was obtained using a 10mm diameter hardened steel ball with a 500 kilogram load applied for a period of 30 seconds. Highly hardened steel cannot be tested by a hardened steel ball because the ball will get flattened and become permanently deformed. The appreciable error in BHN occurs at indentation diameter less than 2.9mm and for softer materials inaccuracy is at diameter greater than 6mm. On tests of extremely hard metals a tungsten carbide ball is substituted for the steel ball (upto 444-627 HB) and a special hardened and burnished steel ball called the "Hulked" ball may be used up to 500 HB.



Compared to the other hardness test methods, the indenter used in brinell makes the deepest and widest indentation, so that test averages the hardness over a wider amount of materials which will accounts for multiple grain structures and any irregularities in the uniformity of the material.

The Brinell hardness number is defined as the ratio of test load to the surface area of indentation.

Metal Hardness Formula

$$BHN = \frac{2P}{\pi D(D - \sqrt{D^2 - d^2})}$$

$BHN - Brinell\ Hardness\ Number\ in\ kg/mm^2$

$P - load\ in\ kgf$

$D - steel\ ball\ diameter\ in\ mm$

$d - depression\ diameter\ in\ mm$

Procedure:-

1 Select the load P based on the type of material selected.

2 The specimen is placed on the supporting table, then the hand wheel below the table is turned in clockwise direction until the gap between the surface of the specimen and the indenter is 5 mm.

3 The motor is switched on. The hand lever is pulled into load position. The load is applied for a period of 10 to 15 seconds.

4 The hand lever is pulled back into unload position. The diameter of the impression is measured through a microscope attached to the apparatus.

5 Repeat the experiment at other positions of the test piece.

6 Calculate the value of HB.

Observation:-

Trial	Material	Diameter of indenter D (mm)	Load P (kg)	Average diameter d_1 (mm)	HBW (kg/mm^2)	Average HBW (kg/mm^2)
1						
2						

CONCLUSION

From the above experiment we have successfully determine the hardness by Rockwell/Vickers hardness testing machine.

EXPERIMENT NO:-06

AIM OF THE EXPERIMENT:-

Determination of toughness of material by using impact testing machine.(charpy/izod).

APPARATUS REQUIRED:-

Sl.no	Name of the apparatus	Specification	Quantity
01	Impact testing machine		01
02	A mild steel specimen	(75x10x10)mm For izod	01
03	A mild steel specimen	(55x10x10)mm For charpy	01

THEORY:-

- An impact test signifies toughness of material that is ability of material to absorb energy during plastic deformation.
- This important factor is determined by impact test .Toughness takes into account both the strength and ductility of the material.
- Several engineering materials have to withstand impact or suddenly applied load while in service.
- Strengths are generally lower as compared to strengths achieved under slowly applied load.
- Of all types of impact test ,the notched bar tests are more extensively used .Therefore the impact test measure the energy necessary to fracture a standard notch bar by applying an impact load.
- The test measures the notch toughness of material under shock loading.

PROCEDURE:-

- Select the test mode i.eizod or charpy ,depending up on the test to be conducted and fix the pendulum holding pipe at the respective anglei.e for izod at 84degree and for charpy at 140 degree and secure it tight with the bolts provided.
- The striker for izod and charpy test are different and depending up on the test to be conducted fix the correct striker on the pendulum hammer end.
- Fix the specimen on the anvil in the position corresponding to the test mode i.eizod or charpy.

- Bring the pointer on the dial to its proper position i.e 16kgm for izod and 30kgm for charpy.
- Release the pendulum by operating the lever for the pendulum to strikes the specimen fitted on the anvil.
- Note the readings indicated by the pointer on the dial, which is the izod or charpy value as the case may be.
- The diagrams of izod and charpy strikers and their positioning on the anvil is enclosed for easy identification and fitment.

OBSERVATION:-

- Energy absorbed by izod test=.....Nm
- Energy absorbed by charpy test=.....Nm

CONCLUSION:-

From the above experiment we determine the toughness of material by using impact testing machine.

EXPERIMENT:-07

AIM OF THE EXPERIMENT :-

Determination of flash point and fire point.

APPARATUS REQUIRED:-

SL.NO	NAME OF THE APPARATUS	SPECIFICATION	QUANTITY
01	Flash point and fire point apparatus		01
02	Fuel	Petrol/Kerosene/Diesel	0.5lit
03	Ignition source	Cotton	
04	Thermometer	Degree Celsius	01

THEORY:-

Flash Point:-

The flash point of any fuel is the lowest temperature at which it can vaporize to form an ignitable mixture in air. At flash point the vapor may easy to burn the source of ignition is removed. The flash is not to be confused with auto ignition temp. Which does not requires an ignition source.

Fire Point:-

The fire point of a fuel is the temp. At which it will continue to burn for at least 5 sec. After ignition by an open flame, fire point can be assumed to be about 10° C higher than the flash point.

PROCEDURE:-

- We take the flash point and fire point apparatus.
- Then, its electric wire plug is connected to the electric circuit board.
- Then, we choose a fuel for testing.
- Then, take a thermometer for taking temp. Of the fuel.
- Fuel is inserted in to the apparatus.
- Set the thermometer and switch on the apparatus for heating.
- Then, the fuel is heating and also you can raise the temp. By a temp Adjustment switches on the apparatus.

- And set the ignition source on the fuel of the apparatus. If it will catch the fire frequently or slightly that is called flash point.
- Then, adjust the ignition source of the fuel. Then, if that ignition source catches the fire continuously that is fire point.

TABULATION:-

Types of fuel	Flash point	Fire point
Petrol		
Diesel		
Kerosene		

CONCLUSION:-

From the above experiment we determine the flash point and the fire point of the fuel.

AIM OF THE EXPERIMENT:-

Determination of torsional rigidity of the shaft by using torsion testing machine.

APPARATUS REQUIRED:-

SL.NO	NAME OF THE APPARATUS	QUANTITY
01	Torsion testing machine	01
02	Mild steel specimen	01
03	Steel rule	01
04	Verniercalliper	01

THEORY:-

- A torsion test is a quite instrumental in determining the value of modulus of rigidity (ratio of sear stress to shear strain) of a metallic specimen.
- The modulus of rigidity can be found out through observations, made during the experiment by using the torsion equation.
- Torque is defined as the product of twisting force to the distance between the point of application of the force and the axis of the shaft.
- The torsion equation is- $T/J=C\theta/L$.

So ,$C=TL/J\theta$

Where,

T=Torque applied.

J=Polar moment of inertia.= $/_{32}XD^4$

D= Diameter of specimen.

C=Modulus of rigidity.

θ=Angle of twist.

L=Gauge length of the specimen in m.

PROCEDURE:-

- Select the driving dogs to suit the size of the specimen and clamp it in the machine by adjusting the length of the specimen by means of a sliding spindle.

- Measure the diameter of the specimen at about three places and take the average values.
- Choose the appropriate range by capacity change lever.
- Set the maximum load pointer to zero.
- Set the protractor to zero for convenience.
- Carry out straining by rotating the hand lever in either direction.
- Load the machine in suitable increments, observing and recording strain gauge.

OBSERVATION TABLE:-

SL.NO	TORQUE APPLIED in (Kg-m)	ANGLE (θ) in degree	T_{mean}(kgm)	θ_{mean}(degree)
1				
2				
3				
4				

CALCULATION:-

Polar moment of inertia (J) =$(\pi/32)xD^4$ mm^4

θ_{mean} =.....=.....x$(\pi/180)$=.....rad

T_{mean} =.....=.....x9.81=.....N-m

Modulus of rigidity(C)=TL/Jθ =.....N/m^2

CONCLUSION:-

From the above experiment we have successfully determine the modulus of rigidity of mild steel specimen by using torsion testing machine.

EXPERIMENT

AIM OF THE EXPERIMENT:-

Determination of Salient points(Young's Modulus, Yield Point, Fracture pointfrom stress –strain curve using Universal Testing Machine(UTM).

APPARATUS REQUIRED:-

SL.NO	NAME OF THE APPARATUS	SPECIFICATION	QUANTITY
01	Universal testing machine	200KN	01
02	Mild steel specimen	L=..... D=.....	01
03	Verniercalliper	Least count=0.02mm	01
04	Steel rule	L=300mm	01

THEORY:-

- The result obtained by the tensile test are widely used in design of material for structures and others purposes.
- In this test the specimen pulled out at a constant rate by gradually increasing the axial pole till the rupture takes place.
- The tensile test for a ductile material is generally carried out with the help of UTM.
- The machine has two units ,one is control unit and another is release valve.
- Control unit is used for controlling the load applied and release valve is used for releasing the hydraulic pressure.
- The tensile test of a material is generally performed to determine –
    - Proportional limit
    - Elastic limit
    - Yield point
    - Ultimate point
    - Fracture point or breaking point

PROPERTIONAL LIMIT:-

We see from the above diagram that from point 'o' to 'A' is a straight line which represents that the stress is proportional to strain. Beyond point 'A',The curve isslightly deviated from the straight line. It is then obeys the hook's law hold up to 'A' and is known as proportional limit.

ELASTIC LIMIT:-

It may be noted that even if the load is increased beyond point 'A' up to point 'B' the material will regain its shape and size after the release of loadup to point B is known as elastic limit.

YIELD POINT:-

If the material is stretched beyond point 'B' the elastic stress will be reached i.e on the removal of the load ,the material will not be able recover its original shape and size .The point 'C' and 'D' are called upper yield and lower yield point respectively .The stress corresponding to yield point is known as yield stress.

ULTIMATE POINT:-

After the lower Yield point ,the specimen regains some strength and higher value of stress are required for higher strain.The stress goes on increasing till point 'E' is reached. At 'E' the stress which attainsits maximum values is known as ultimate tensile stress.

BREAKING POINT:-

After the specimen has reached to the ultimate stress the neck is formed which decreases the cross sectional area of the specimen. The stress is therefore reduced until the specimen breaks itself at point 'F'. The stress corresponding to point 'F' is known as breaking sress.

MATHEMATICALFORMULA USED:-

Stress =load/cross sectional area

$\sigma=P/A$

Its unit is N/M^2

Strain =change in length/original length

$e=\Delta l/l$

It is unit less.

Young 's modulus(E)=stress/strain= σ/e

Its unit is N/M^2

OBSERVATION TABLE:-

Sl no.	Load applied(P)	Change in length(Δl)	stress(P/A)	strain(Δl/l)	Young's modulus(σ/e)

CALCULATION:-

Area of specimen=$(\Pi/4)xd^2$

=.....

Stress=P/A=.....

Strain=Δl/l=.....

Young's modulus=stress/strain=.....

CONCLUSION:-

From the above experiment we have successfully determine the young's modulus of mild steel specimen by using universal testing machine.

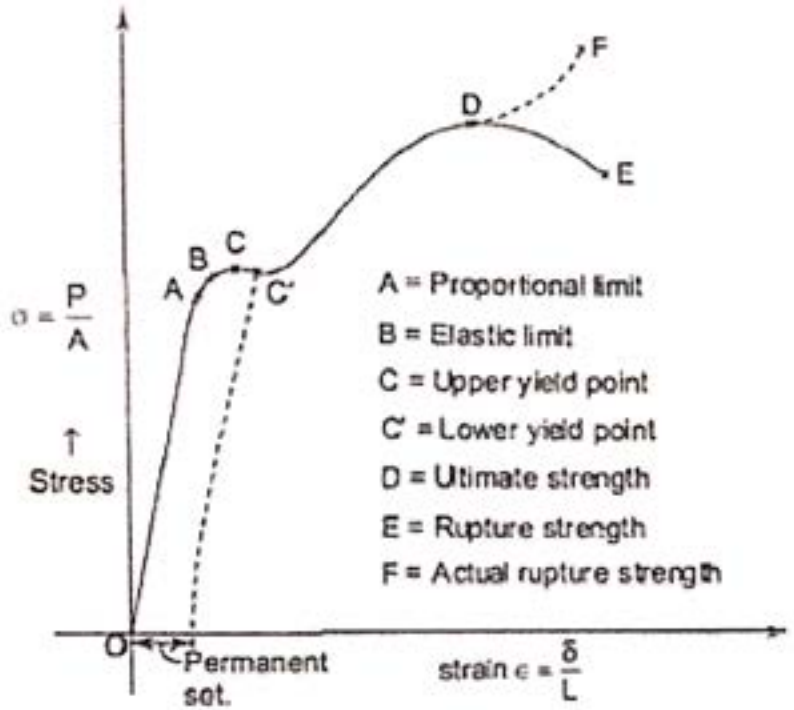


Fig. 2.2

Conditions f-or $\epsilon = \frac{\delta}{L}$ to be constant.

STRESS STRAIN CURVE FOR MILD STEEL

EXPERIMENT

AIM OF THE EXPERIMENT:-

Determination of hardness number by Rockwell OrVickers hardness testing machine.

APPARATUS REQUIRED:-

Sl.no	Name of the apparatus	Specification	Quantity
01	Rockwell hardness testing machine	150Kgf	01
02	High speed steel	HRC/HRB	02
03	Indentors	Diamond tip	01

THEORY:-

- The hardness of a material is resistance to penetration under a localized pressure or resistance to abrasion.
- Hardness test provide an accurate, rapid and economy way of determining the resistance of material to deformation.
- There are generally three types of hardness measurment depending upon the manner in which the test is conducted.
    - Scratch hardness measurement.
    - Rebound hardness measurement.
    - Indentation hardness measurement.

PROCEDURE:-

- Insert indenter on to the machine.
- Make the specimen surface clean by removing the dust ,dirt,oil and grease etc.
- Select 150kgf load.
- Make contact between the surface and the ball by rotating the jack, adjusting wheel till the needle touch the red mark.
- Pull the load release lever and wait for minimum 30sec. The load will automatically apply gradually.
- Note the hardness reading.
- Repeats the entire operation three times.

OBSERVATION:-

Sl.no	Hardness no.	Mean hardness(HRC)	Mean hardness(HRB)

CONCLUSION:-

From the above experiment we have successfully determine the hardness by Rockwell/Vickers hardness testing machine.

EXPERIMENT

AIM OF THE EXPERIMENT:-

Determination of toughness of material by using impact testing machine.(charpy/izod).

APPARATUS REQUIRED:-

Sl.no	Name of the apparatus	Specification	Quantity
01	Impact testing machine		01
02	A mild steel specimen	(75x10x10)mm For izod	01
03	A mild steel specimen	(55x10x10)mm For charpy	01

THEORY:-

- An impact test signifies toughness of material that is ability of material to absorb energy during plastic deformation.
- This important factor is determined by impact test .Toughness takes into account both the strength and ductility of the material.
- Several engineering materials have to withstand impact or suddenly applied load while in service.
- Strengths are generally lower as compared to strengths achieved under slowly applied load.
- Of all types of impact test ,the notched bar tests are more extensively used .Therefore the impact test measure the energy necessary to fracture a standard notch bar by applying an impact load.
- The test measures the notch toughness of material under shock loading.

PROCEDURE:-

- Select the test mode i.eizod or charpy ,depending up on the test to be conducted and fix the pendulum holding pipe at the respective anglei.e for izod at 84degree and for charpy at 140 degree and secure it tight with the bolts provided.
- The striker for izod and charpy test are different and depending up on the test to be conducted fix the correct striker on the pendulum hammer end.
- Fix the specimen on the anvil in the position corresponding to the test mode i.eizod or charpy.
- Bring the pointer on the dial to its proper position i.e 16kgm for izod and 30kgm for charpy.
- Release the pendulum by operating the lever for the pendulum to strikes the specimen fitted on the anvil.
- Note the readings indicated by the pointer on the dial, which is the izod or charpy value as the case may be.
- The diagrams of izod and charpy strikers and their positioning on the anvil is enclosed for easy identification and fitment.

OBSERVATION:-

- Energy absorbed by izod test=.....Nm
- Energy absorbed by charpy test=.....Nm

CONCLUSION:-

From the above experiment we determine the toughness of material by using impact testing machine.

EXPERIMENT

AIM OF THE EXPERIMENT :-

Determination of flash point and fire point.

APPARATUS REQUIRED:-

SL.NO	NAME OF THE APPARATUS	SPECIFICATION	QUANTITY
01	Flash point and fire point apparatus		01
02	Fuel	Petrol/Kerosene/Diesel	0.5lit
03	Ignition source	Cotton	
04	Thermometer	Degree Celsius	01

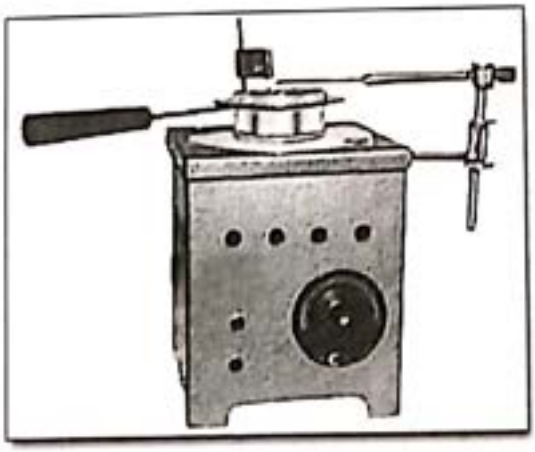
THEORY:-

Flash Point:-

The flash point of any fuel is the lowest temperature at which it can vaporize to form an ignitable mixture in air. At flash point the vapor may easy to burn the source of ignition is removed. The flash is not to be confused with auto ignition temp. Which does not requires an ignition source.

Fire Point:-

The fire point of a fuel is the temp. At which it will continue to burn for at least 5 sec. After ignition by an open flame, fire point can be assumed to be about 10° C higher than the flash point.



FLASH POINT AND FIRE POINT APPARATUS

PROCEDURE:-

- We take the flash point and fire point apparatus.
- Then, its electric wire plug is connected to the electric circuit board.
- Then, we choose a fuel for testing.
- Then, take a thermometer for taking temp. Of the fuel.
- Fuel is inserted in to the apparatus.
- Set the thermometer and switch on the apparatus for heating.
- Then, the fuel is heating and also you can raise the temp. By a temp Adjustment switches on the apparatus.
- And set the ignition source on the fuel of the apparatus. If it will catch the fire frequently or slightly that is called flash point.
- Then, adjust the ignition source of the fuel. Then, if that ignition source catches the fire continuously that is fire point.

TABULATION:-

Types of fuel	Flash point	Fire point
Petrol		
Diesel		
Kerosene		

CONCLUSION:-

From the above experiment we determine the flash point and the fire point of the fuel.

EXPERIMENT NO 08

AIM OF THE EXPERIMENT

Determination of compressive strength of specimen by using compression testing machine.

APPARATUS REQURIED :-

- compression testing machine

THEORY

OPERATING PARTS

1. RELEASE VALVE (ON LEFT HAND SIDE)

- There is one wheel on the left hand side of the pressure unit for releasing and closing the pressure unit
- For applying the load , close the release valve and for release of the load , open the release valve.
- The machine is operated by hand or with the help power source
- This is provided on the front part of the pressure unit (on left hand side)

2. LOAD INDICATOR :

It shows the pressure (load) & also used for controlling the pressure (load)

PROCEDURE:-

- Observe the specimen. .Measure its diameter and length.
- Place the specimen in between the middle and lower cross heads of the C.M.T
- Fix the dial gauge in its proper position. Adjust the dial reading to zero initially or note down the dial gauge reading corresponding to zero load.
- Select proper range of loading.
- Switch on the machine. Apply the axial compressive load on the specimen gradually. Note down the dial gauge reading at a constant load.
- Loading is continued and can be stopped at any stage after this. The specimen will not fail under compression in the case of highly duetile material.
- Release the load. Switch off the machine. Removing the tested specimen and observe its shape.

Calculation $L = 2mm$ $A = mm^2$, Compressive strength $= \frac{F}{A}$ N.
$w = 2mm$

CONCLUSION :

The compressive strength of the given specimen is ..... KN