EXPERIMENT NO-01

AIM OF THE EXPERIMENT:-

Determination of the thickness of ground M.S. Flat to an accuracy of 0.02mm using Venire caliper.

APPARATUS REQUIRED:-

SL.NO	Name of the Items	Specification	Quantity
01.	Vernier caliper	150mn.	01
02.	M.S Flat	(150x50x6)mm (100x50x6)mm	02.

THEORY:-

A vernier caliper is a precision measuring instrument used to measure inside & outside diameter and depth up to an accuracy of 0.02mm. Lower jaw is used to measure external diameter, upper jaw is used to internal and depth bar is used to measure depth or thickness of a job. The graduation on the vernier scale and main scale gives the reading. Vernier calipers are available in the size of 150mm, 225mm, 900mm and 1200mm.

PROCEDURE:-

1. At first we took the vernier caliper and adjusted it correctly So that the vernier scale zero and main scale zero coincide each other.

2. Then we calculate the least count of the vernier scale.

3. Then we took the M.S Flat and kept it inside the external die measuring jaw.

4. We took the main scale reading and vernier scale division.

5. Then we noted down in the table.

6. In this way we take 5 observations.

OBSERVATION:-

50 V.S.D = 49 M.S.D 1 V.S.D =49/50

1 M.S.D =1mm. Least count = 1 M.S.D-1 V.S.D

=1mm-49/50

=0.02mm.

TABULATION :-(All units are in mm)

SL.NO.	M.S.R in mm	V.S.D	L.C in mm	V.S.R(V.S.D x L.C)	M.S.R +V.S.R	Reading in mm	Remarks
01			0.02	0.32			
02			0.02	0.60			
03			0.02	0.50			
04			0.02	0.40			
05			0.02	0.62			

CONCLUSION:-

Hence we measure the dimensions of ground M.S Flat correctly.

EXPERIMENT NO-02

AIM OF THE EXPERIMENT:-

Determination of diameter of a cylindrical component to an accuracy of 0.01mm using micrometer **and check the result with digital micrometer**.

APPARATUS REQUIRED:-

SL.NO	Name of the Items	Specification	Quantity
01	Outside Micrometer	(0.25mm)	01
02	Digital Micrometer	(0.25mm)	01
03	Cylindrical component	20x50mm	02

THEORY:-

A micrometer is a precision measuring instrument used to measure a job generally with an accuracy of 0.01mm. Micrometers used to take the outside measurements are known as outside micrometer. The frame is the main part in which all other parts of the micrometers are attached to it. The datum line and graduations are marked on barrel. Graduations are also marked on **beveled** surface of the **thimble**. One end of spindle and anvil are measuring faces. To lock the spindle at desired position lock nut is used, the ratchet stop gives uniform pressure between measuring surfaces.

PROCEDURE:-

1. At first we took the micrometer and adjust it correctly.
2. Then we calculated the least count of the micrometer.
3. Then we took the cylindrical component and kept it in between spindle and anvil.
4. Then we noted the reading.
5. Then took the reading by digital micrometer.
6. Repeating the above procedure for 5 observations.

OBSERVATION:-

Least count:-

The distance moved by the spindle during one rotation of thimble is 0.5mm.Movement of one division of the

Thimble = 0.5 x 1/50 = 0.01mm.

TABULATION:- (All units are in mm)

SL.NO	Barrel Reading(x)	Thimble Division	Least Count	Thimble(y) Reading L.C x T.D	X +Y	Reading	Digital micrometer Reading	Error
01								
02								
03								
04								
05								

CONCLUSION:-

Hence the diameter of the cylindrical component is checked to an accuracy of 0.01mm in micrometer and the result has compared with the digital micrometer. The reading of digital micrometer found to be mere accurate.

EXPERIMENT NO-03

AIM OF THE EXPERIMENT:-

Determination of the heights of gauge blocks or parallel bars to an accuracy of 0.02mm using vernier height gauge **and check the result with digital vernier height gauge**.

APPARATUS REQUIRED:-

SL.NO	Name of the Items	Specification	Quantity
01	Vernier height gauge	300mm	01
02	Digital Vernier height gauge	300mm	01
03	Parallel bars	100 x50 x 6mm	02`
04	Gauge blocks	1 boxes (81 pc s)	1 box

Theory-

PROCEDURE:-

1. At first the base of the instrument is held firmly on the reference surface.
2.
3. Moves the beam upwards until it contacts the upper surface of parallel bars.

4. Then final adjustment is done by fine adjustment screw.
5. The clamping screw is then tightened.
6. Take the **reading of the**

TABULATIONS:-

SL.NO	MSR	VSD	L.C	VSR=VSD X L.C	MSR +VSR	Reading	Digital Reading	Error
1 2 3 4 5								

CONCLUSION:-

Hence the height of gauge blocks or parallel bars are checked by vernier height gauge and compare with digital vernier height gauge & found to be more accurate.

EXPERIMENT NO-04

AIM OF THE EXPERIMENT:-

Determination the thickness of M.S. Plates using slip gauges.

APPARATUS REQUIRED:-

SL.NO	Name of the Items	Specification	Quantity
01	M.S Plates	(100 x 50 x06)mm	02
02	Slip gauge	**(0-83),** 30mmx 9mm size	1 box
03	Surface Plate	300 x 300	01
04	Vernier height gauge	300mm	01

THEORY:-

A slip gauge is a rectangular block of hardened ground lapped steel with extremely high degree of flatness. Slip gauge are used as standard for precision length measurement. These are made in set and consist of a number of hardened blocks with low thermal expansion. The two opposite measuring faces of definite size is extremely close tolerance. The size of the slip gauges is 30mmx 9mm.

PROCEDURE:-

1. At first we cleaned the surface of slip gauge.
2. Then we inserted the slip gauge for measuring the thickness by taking attention such that minimum number of slip gauges is used.
3.
4. Than we removed the gauge from jobs.
5.
6. We calculated the thickness by adding indivisual slip gauge reading which is mentioned on the surface of slip gauge.
7. In this way by repeating above procedure we took 5 reading.

For measuring the thickness of M.S plate by using set of 112 pieces.

Range in mm	Steps	No of pieces

1.005		01
1.001 to 1.009	0.001	09
1.01 to 1.49	0.01	49
05 to 24.5	0.05	49
25 to 100	25.00	04

TABULATION:-

SL .NO	Select the slip gauges	Select the slip	Select 2nd	Select 3rd	Select 4th	Total reading	Average reading
01	1.005	1.002	1.37	1.5	0	4.8725	4.1515
02	1.0005	1.003	1.25	2	0	5.2535	
03	1.0005	1.001	1.15	1.2	0	4.1515	
04	1.0005	0.008	1.13	0.5	0	3.6385	
05	1.0005	1.008	1.45	2.5	0	5.9585	

CONCLUSION:-

From the above experiment we find the thickness of M.S plate by using the range of slip gauges.

EXPERIMENT NO-05

AIM OF THE EXPERIMENT:-

To determine the angle of machined surfaces of components using sin bar with slip gauges.

APPARATUS REQUIRED:-

SL.NO	Name of the Items	Specification	Quantity
01	One machined surface in any angle		01
02	Sine bar	200mm	01
03	Slip gauge box	(0-83) pcs	01 set

THEORY:-

Sin bar:-

It is based on the sin angle of the right angle triangle. That's why it is known as sin bar. Sin of an angle of a right angled triangle its perpendicular is divided by hypotenuses. Sine bars are available in size of 5", 10" and 20" and its accuracy of grade-"A" is 0.00001" per inch for grade-"B" is 0.002" per inch.

SLIP GAUGES:-

For measuring and checking the size of such jobs slip gauge are used. There are generally made of tool steel. Their gauging surface is quite plain. When two pieces of gauges are kept properly one over the other, they stick to each other, so it gives high accuracy measurement as the gap between the slip gauges is negligible.

PROCEDURE:-

1. At first keep the sine bar on the machined surface.
2. Keep the slip gauges below the two ends of the sine bar.
3. From that compute h1, h2 height and length L of sine bar and put it in the following table.

TABULATION:-

SL.NO	h1 in mm.	h2 in mm.	h1-h2 in mm.	L in mm	Sin Q=h1-h2/e in(0)	Q=sin h1-h2/e in radian
1	3.25	1.5	1.75	200	1.75/200	5radiam=28.72

CONCLUSION:-

From the above experiment we calculated the angle of machined surface is 28.72

EXPERIMENT NO-06

AIM OF THE EXPERIMENT:-To determine the centrifugal force of a governor.

APPARATUS REQURIED:

SLNO	Equipment	Specification	Quantity
01	Centrifugal governor	**watt**	
02	Steel rule	0-30cm	03
03	tachometer		01

THEORY:-

Governor is a device which automatically controls the supply of working fluid to the engine with the varying load conditions and keeps the mean speed with contain limit. The main function of a governor is to regulate the mean speed an engine, **when**

There are variations in the load by controlling the supply of working fluid.

Governors are of two types:

(I) Centrifugal governor
(II) Inertia governor

Generally centrifugal type governor are used in the practical field, In centrifugal governor forces of the rotating masses due to change in speed of the engine is used for the movement of the governor sleeve which is also controlled by dead weight of the sleeve or the spring.

TECHNICAL SPECIFICATION OF THE APPARATUS:-

Length of the link (l)

Initial height (ho)
initial radius (r)

Distance(y)

Twilight of ball (wb)

Radius of rotation(r)

TABULATION:-

SL NO	SLEEVE MOVING UPWARDS (Increasing speed)		SLEEVE MOVIHG DOWNWARD (decreasing speed)	
	Speed in RAM(N1)	SLEEVE LIFT In MM(h1)	SPEED IN RAM(N2)	SLEEVE LIFT In MM(h2)
01				
02				
03				
04				
05				
Mean speed				

CALCUTION:-

Radius of rotation(r)

Centrifugal force (f) =

% of sensitivity

CONCLUSION:

From the above experiment, we study and calculate the percentage in sensitivity of watt governor.

EXPERIMENT NO-07

AIM OF THE EXPERIMENT:-

– To study about static balancing apparatus.

APPARATUS REQUIRED:-

SL NO	Equipment	Specification	Quantity
01	Static blanching Apparatus		01
02	Block of different weight		06
03	Iron balls	Small size	
04	Weight pans		

THEORY:

The term "static" dates back to the days before sophisticated balancing machines were available to measure unbalance static balance is where the main axis is displaced only parallel to the shaft axis. The un-balance is correct in one axial plane.

PROCEDURE:-

1.
2. Remove the belt.
3. Screw the combined hook to the pulley with groove.
4. Attach the cord ends of the pans to the above combined hook.

5.
6. Attach the block No.1 of the shaft at any convenient position and in vertical downward direction.
7.
8. Put steel balls in one of the pans till the block starts moving up.(up to horizontal position).
9. No. of balls give the WR. value of block No.1.
10. Repeat this for 2-3 times and find the average No. of balls.
11. Repeat the procedure for other block.

Sl.No.	WR. Weight	
01		
02		
03		
04		
05		
06		

Avg.: WR. Value of one block= $\frac{\text{Sum of all WR. Weight}}{\text{No. of blocks.}}$

Conclusion:-

Finally we calculate the average WR. Weight for static balancing apparatus.

EXPERIMENT NO-08

AIM OF THE EXPERIMENT:-

To study and demonstration of journal bearing apparatus.

APPARATUS REQUIRED:-

SL. NO.	Equipments	Specification	Quantity
01	M.S bearing mounted freely on journal shaft		01
02	Motor A.C	0.5HP	01
03	Balancing weight	1kg	01
04	Manometer Board	--	01
05	Flexible tube	--	16.
06	Oil reservoir	--	01
07	Collecting tank oil	--	01
08	Oil (Red color)	SEA40	--

Specification:-

1. Diameter of journal =
2. Diameter of bearing(outer)=
3. Diameter of bearing (Inner)=
4. Bearing width=
5. Weight =
6. Motor=
7. Motor Control= Dimmer start
8. Manometer board with 16 tubes with suitable scales and oil supply tank.
9. Recommended oil=
10. Supply required=

THEORY:-

Journal bearing is designed on the basis if hydrodynamic bearing action used in practice to formulate the bearing action accurate in mathematical terms is a more complex job.

However one can visualize pattern of bearing pressure distribution due to hydrodynamic action with the help of experimental rig. This helps to understand the subject properly. The experimental test rig consist of small journal bearing. This apparatus helps to demonstrate and study effect of important variables such as- speed, viscosity and load on the pressure distribution can be verified with summer field equation.

EXPERIMENTAL PROCEDURE:-

Fill the oil tank by using SAE-40 oil and position the tank at desired height.

Drain out the air from the tubes on the manometer and check level balance with supply level.

Check the direction of rotation (it should be clock wise) and increase the speed of motor slowly.

Set the speed and put the load on the bearing and Let the journal run for about twenty minutes until the oil in the bearing warms and check the steady oil level at various tubes on manometer.

1.when manometer levels have settled down take the pressure readings on 16 manometer tubes

2. See that the balancing rod in horizontal position and observe steady levels

3. Repeat the experiment for various speeds and lends.

4. After the test is over set the dimmer to zero & suritch off the power.

5. Keep the oil tank at lower most position so that there will be leant leakage in ideal period

TABULATION-

SL.NO	P(mm)	(P-P0)max	
01			
02			
03			
04			
05			
06			
07			
08			

09			
10			
11			
12			
A			
B			
C			
D			

CALCULATION:-

Conclusion:-

Form the above experiment, we have successful studies and verify about journal bearing apparatus.

EXPERIMENT NO-09

Aim of the Experiment:-

To study about cam analysis apparatus and Follower.

APPARATUS REQUIRED:-

SL NO	Equipment	Specification	Quantity
01	CAM analysis apparatus		
02	Tachometer		
03	Weight		

Theory:-

:-A cam is a rotating machine element which gives reciprocating or oscilating motion to another element known as follower.

:-The cam and follower have a line contact and constitute a higher pair. The cams are rotated at uniform speed by a shaft, but the follower motion is predetermined and will be according to the shape of the cam.

The cams are widely used for operating the inlet and exhaust values of an internal combustion engine, automatic attachment of machineries, paper cutting machines ,spinning and weaving textile machineries ,feed mechanism and automatic lathe machine.

Procedure:-

1. Select the suitable cams & follower c0nbination.
2. Fix the driving speed.
3. Fix the follower on the pushrod and properly tighter the check nut, such that knife edge if the follower or axis or roller follower is parallel to the axis of cam shaft.
4. Choose the suitable weights to be added for follower
5. See the knob of dimmer start is at zero pissition.
6. Now switch on the supply and increase speed gradually and take the reading.

SL NO	Weight added on follower (w)kg	Jump speed (N)RPM	
01			
02			
03			
04			

From the above observation table we conclude that when the load increase the speed decreases.

Conclusion :-

We have successfully studied about cam axis apparatus.