



**DEPARTMENT OF MECHANICAL ENGINEERING
17MECC85- ENGINE TESTING LAB (UG)
STANDARD OPERATING PROCEDURE**

| | |
|---------------------------|--|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students on checking the viscosity of any lubricating oil or fuel using Redwood viscometer. |
| Scope | To know the viscosity of different lubrication oils and fuels Use of lubrication oils or fuels based on its viscosity |
| Responsibility | Faculty Incharge, HOD/MECH |

STANDARD OPERATING PROCEDURE FOR THERMAL CONDUCTIVITY OF A LAGGED PIPE

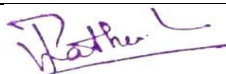
- Clean the cylindrical oil cup and ensure the orifice tube is free from dirt.
- Close the orifice with ball valve.
- Place the 50 ml flask below the opening of the orifice.
- Fill the oil in the cylindrical cup up to the mark in the cup.
- Fill the water in the water bath.
- Insert the thermometers in the respective places to measure the oil and water bath temperatures.
- Heat the oil by heating the water bath. Stir the water bath and maintain uniform temperature.
- At a particular temperature lift the ball valve and collect the oil in the 50 ml flask and note the time taken for collecting 50 ml of the oil. This time is called Redwood seconds.
- Increase the temperature and repeat the procedure and note down the Redwood seconds.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear ID Cards, watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment.

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record



HOD/Mech



AVIT
AARUPADAI VEEDU INSTITUTE OF TECHNOLOGY



VINAYAKA MISSION'S
RESEARCH FOUNDATION
(Deemed to be University under section 3 of the UGC Act 1956)



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17MECC85- ENGINE TESTING LAB (UG)
STANDARD OPERATING PROCEDURE**

| | |
|---------------------------|---|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students on checking the flash and fire points of lubricating oil or fuel sample. |
| Scope | To know the flash and fire points of different lubrication oils and fuels Use of lubrication oils or fuels based on its flash and fire points. |
| Responsibility | Faculty Incharge, HOD/MECH |

STANDARD OPERATING PROCEDURE FOR TWO SLAB GUARDED HOT PLATE METHOD APPARATUS

- Clean the cup and fill it with the given sample of oil up to the filling mark.
- Insert the thermometer in the holder. Make sure that the thermometer should not touch the metallic cup.
- Heat the oil by means of electric heater so that the sample of oil gives out vapour at the rate of 10⁰C per minute.
- When the oil gives out vapour, introduce the test flame above the oil, without touching the surface of the oil and watch for flash or flickering sound.
- Introducing test flame should be continued at regular intervals until the first flash is observed with peak flickering sound. The temperature corresponding to this flickering sound is noticed and it is the flash point temperature of the given sample of oil.
- Continue the process of heating and introducing the test flame until the oil begins to burn continuously and observe the temperature; this is the fire point temperature of the given sample of oil.
- Repeat the test twice or thrice with fresh sample of oil and observe the results.
- The observations are tabulated.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear ID Cards, watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record.

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17MECC85- ENGINE TESTING LAB (UG) STANDARD OPERATING PROCEDURE

| | |
|---|--|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students to know the differences between the actual and theoretical valve timing diagrams. |
| Scope | To know when the inlet and exhaust valves open and close, when fuel injection starts and stops. |
| Responsibility | Faculty Incharge, HOD/MECH |
| STANDARD OPERATING PROCEDURE FOR COMPOSITE WALL APPARATUS | |
| <ul style="list-style-type: none"> Identify the engine components and ports from the cut –section of the engine. Mark the TDC and BDC position on the flywheel. Insert the paper in the tappet clearance of both inlet and exhaust valves. Slowly rotate the crank until the paper in the tappet clearance of inlet valve is gripped. Make the mark on flywheel against fixed reference. This position represents the inlet valve open(IVO). Measure the distance from TDC and tabulate the distance. Rotate the crank further, till the paper is just free to move. Make the marking on the flywheel against the fixed reference. This position represents the inlet valve close (IVC). Measure the distance from BDC and tabulate the distance. Rotate the crank further, till the paper in the tappet clearance of exhaust valve is gripped. Make the marking on the flywheel against the fixed reference. This position represents the exhaust valve open. Measure the distance from BDC and tabulate it. Rotate the crank further, till the paper in the tappet clearance of exhaust valve is just free to move. Make the marking on the flywheel against the fixed reference. This position represent the exhaust valve close (EVC). Measure the distance from TDC and tabulate it. Then convert the measured distances into angle in degrees. <p>PRECAUTIONS TO BE FOLLOWED</p> <ul style="list-style-type: none"> Do not conduct an experiment without the complete knowledge of its operating procedure. Wear tight fitting clothes and thick leather shoes. In case of any injury, use the FIRST AID KIT. Report any fault (or) damage in the equipment to inform the lab in charge. Use stop watches, thermometers and accessories carefully. Do not wear ID Cards, watches (or) bracelets while working in the equipments. Do not remove safety guards or parts of any equipment <p>RECORD TO BE MAINTAINED</p> <ul style="list-style-type: none"> Laboratory Manual containing the experiments that can be performed with the equipment Maintenance Record | |

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**DEPARTMENT OF MECHANICAL ENGINEERING
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| | |
|---------------------------|--|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students to know the differences between the actual and theoretical port timing diagrams. |
| Scope | To know when the inlet, exhaust and transfer ports open and close, when an ignition starts and what is the dwell period of ignition. |
| Responsibility | Faculty Incharge, HOD/MECH |

STANDARD OPERATING PROCEDURE FOR PIN – FIN APPARATUS

- Identify the engine components and ports from the cut –section of the engine.
- Mark the TDC and BDC position on the flywheel.
- Rotate the flywheel in clockwise direction and observe the movement of piston and opening of ports as the cylinder moves up and down.
- When the piston moves from BDC to TDC mark on the flywheel the inlet port openings as the piston's skirt uncovers bottom end of the inlet port. Similarly mark the inlet port closing as the piston's skirt covers the port as it moves from TDC to BDC.
- In the same stroke observing the opening of transfer port and exhaust port mark the positions on the flywheel. Thus the following positions, Transfer Port Open, Exhaust Port open, Transfer Port Close and Exhaust Port Close are marked in sequence.
- Measure the distance of Inlet Port Open and Inlet Port Close from TDC .
- Measure the distance of Transfer Port Open, Exhaust Port Open , Transfer Port Close and Exhaust Port Close from BDC.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes. In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear ID Cards, watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

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17MECC85- ENGINE TESTING LAB (UG)
STANDARD OPERATING PROCEDURE

| | |
|---|---|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students on performance of twin cylinder four stroke diesel engine. |
| Scope | How to operate an engine, how to control speed, torque and fuel flow into an engine. |
| Responsibility | Faculty Incharge, HOD/MECH |
| STANDARD OPERATING PROCEDURE FOR FORCED CONVECTION APPARATUS | |
| <ul style="list-style-type: none"> Calculate the maximum load that can be applied on the engine from its specifications. Check the engine for fuel availability, lubricant and cooling water connections. Release the load on engine completely and start the engine with no load applied in the brakes. Allow the engine to run for few minutes to attain the rated speed. Adjust the flow of cooling water and maintain steady flow along the cooling water jackets by verifying the outlet. Apply the desired load, from no load slowly and steadily. At the desired load condition take note of the following observations. <ul style="list-style-type: none"> Load on the engine. Speed of the engine. Time taken for 5 revolutions of energy meter disc. Time taken for 10 cc of fuel consumption. Voltmeter Reading Ammeter Reading Repeat the procedure up to desired load conditions and tabulate the readings. Bring the engine back to no load conditions and shut down the engine. <p>PRECAUTIONS TO BE FOLLOWED</p> <ul style="list-style-type: none"> Do not conduct an experiment without the complete knowledge of its operating procedure. Wear tight fitting clothes and thick leather shoes. In case of any injury, use the FIRST AID KIT. Report any fault (or) damage in the equipment to inform the lab in charge. Use stop watches, thermometers and accessories carefully. Do not wear ID Cards, watches (or) bracelets while working in the equipments. Do not remove safety guards or parts of any equipment <p>RECORD TO BE MAINTAINED</p> <ul style="list-style-type: none"> Laboratory Manual containing the experiments that can be performed with the equipment Maintenance Record | |

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DEPARTMENT OF MECHANICAL ENGINEERING
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STANDARD OPERATING PROCEDURE

| | |
|---------------------------|--|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students on performance of 4-cylindereed petrol engine with each cylinder deactivation. |
| Scope | To know to operate an engine, how to control speed, torque and fuel flow into an engine. To know to deactivate each cylinder and conduct Mohr's test. |
| Responsibility | Faculty Incharge, HOD/MECH |

STANDARD OPERATING PROCEDURE FOR NATURAL CONVECTION APPARATUS

- Before switch on the equipment the dimerstat at zero position.
- Switch on the power supply & adjust the dimerstat to set the required input.
- Observe temperature readings and start tabulating the values after 10 – 15 minutes.
- Note down the temperature readings of all thermocouples at a constant frequency until steady state conditions are reached.
- Calculate the theoretical & experimental free convective heat transfer coefficients.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear ID Cards, watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

RECORD TO BE MAINTAINED

- Laboratory Manual containing the experiments that can be performed with the equipment
- Maintenance Record

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| | |
|---------------------------|---|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students on performance of a single cylinder four stroke diesel engine. |
| Scope | To know to operate an engine, how to control speed, torque and fuel flow into an engine. To know how to calculate the frictional power of an engine. |
| Responsibility | Faculty Incharge, HOD/MECH |

STANDARD OPERATING PROCEDURE FOR EMISSIVITY APPARATUS

- Before switch on the equipment the dimerstat at zero position.
- Switch on the power supply and adjust the dimerstat to set the required input.
- Switch on the power supply to put grey body side and some input is given to the grey body heater, which can be read on the wattmeter.
- Then the switch is changed to the black body and same heat input is given to the black body.
- The use of single wattmeter ensures that wattmeter error remains constant for the two cases.
- The temperature of the black body and the grey body will increase. The temperatures can be seen on the solid State temperature indicator.
- It may be observed that for the same heating value the black body temperature will be lower than that of the grey body temperature due its higher capacity for radiation.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes, In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear ID Cards, watches (or) bracelets while working in the equipments.
- Do not remove safety guards or parts of any equipment

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| | |
|---------------------------|--|
| Name of the Lab./facility | Engine Testing Lab |
| Purpose | To provide training for students on performance of a variable compression ratio, single cylindered four stroke diesel engine |
| Scope | To know to operate an engine, how to control speed, torque and fuel flow into an engine. To know how to measure an engine out emissions using exhaust gas analyzer and smoke meter. |
| Responsibility | Faculty Incharge, HOD/MECH |

STANDARD OPERATING PROCEDURE FOR HEAT EXCHANGER APPARATUS

- Calculate the maximum load that can be applied on the engine from its specifications.
- Check the engine for fuel availability, lubricant and cooling water connections.
- Release the load on engine completely and start the engine with no load applied in the brakes.
- Allow the engine to run for few minutes to attain the rated speed.
 - Adjust the flow of cooling water and maintain steady flow along the cooling water jackets by verifying the outlet.
- Apply the load and increase the load up to maximum load. Now note the load on the engine and speed of the engine at this maximum load.
- Cut-off the ignition of first cylinder. Now the speed of the engine will be observed to getting decreased. Reduce the load on the engine until the speed of the engine is maintained the same as before.
- Bring all the four cylinders in working condition and repeat the same procedure by cutting-off cylinders one after the other and tabulate the load conditions. The engine is made to run at constant speed with variation in load when cylinders are cut-off.
- Bring the engine back to no load conditions and shut down the engine.

PRECAUTIONS TO BE FOLLOWED

- Do not conduct an experiment without the complete knowledge of its operating procedure.
- Wear tight fitting clothes and thick leather shoes.
- In case of any injury, use the FIRST AID KIT.
- Report any fault (or) damage in the equipment to inform the lab in charge.
- Use stop watches, thermometers and accessories carefully.
- Do not wear ID Cards, watches (or) bracelets while working in the equipments.
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