Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, 1st In-Sem. Examination

B. Voc. Program, Winter Semester (2019-20)

Course Code: AUT1101 **Time: 1 Hour**

Course Name: Automotive Power Train, Chassis & Suspension

Max. Marks: 20

Instructions:

1. Answer all questions from **"Section-A"**, each question carries 01 mark.
2. Answer all questions from **"Section-B"**, each question carries 02 marks.
3. Answer all questions from "**Section-C**", each question carries 03 marks.

Section – A

Directions: Select any one correct answer from the given options: 05X01 = 05 Marks

1) The inside diameter of cylinder is called .....
   a) Stroke
   b) Radius
   c) Bore
   d) All of the above
2) When piston is at the top, the volume contained in the cylinder above the top of the piston is called.....
   a) Swept volume
   b) Clearance volume
   c) Total cylinder volume
   d) None of these
3) ..... is ratio of total cylinder volume to clearance Volume.
   a) Compression ratio
   b) Air fuel ratio
   c) Gear ratio
   d) Volume ratio
4) The word "Automobile" means:
   a) Auto-drive
   b) Self-Moving
   c) Self-controlling
   d) All of the above
5) Which of the following is not an internal combustion engine?
   a) Petrol engine
   b) Diesel engine
   c) 4 stroke engine
   d) Gas turbine

Section – B

03X02 = 06 Marks

6) Define the term "Automobile".
7) List the major components of IC engine.
8) Draw a labelled diagram of 4-wheel drive vehicle.

Section – C

03X03 = 09 Marks

9) Discuss the roles and responsibilities of an automotive technicians.
10) What are the various safety practices that must be followed in an automobile workshop?
11) Explain the working of 4-stroke diesel engine with the help of a diagram.

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, 1st In-Sem. Examination

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2. Answer all questions from **"Section-B"**, each question carries 02 marks.
3. Answer all questions from **"Section-C"**, each question carries 03 marks.

Section – A

Directions: Select any one correct answer from the given options: 05X01 = 05 Marks

1) The inside diameter of cylinder is called .....

   a) Stroke
   b) Radius
   c) Bore
   d) All of the above

Ans: c)

2) When piston is at the top, the volume contained in the cylinder above the top of the piston is called.....

   a) Swept volume
   b) Clearance volume
   c) Total cylinder volume
   d) None of these

Ans: b)

3) ..... is ratio of total cylinder volume to clearance Volume.

   a) Compression ratio
   b) Air fuel ratio
   c) Gear ratio
   d) Volume ratio

Ans: a)

4) The word "Automobile" means:

   a) Auto-drive
   b) Self-Moving
   c) Self-controlling
   d) All of the above

Ans: b)

5) Which of the following is not an internal combustion engine?

   a) Petrol engine
   b) Diesel engine
   c) 4 stroke engine
   d) Gas turbine

Ans: d)

Section – B

03X02 = 06 Marks

6) Define the term "Automobile".

Ans: An automobile is a self-moving vehicle driven by its own motive power. Eg. Car , bus jeep, truck ,etc.

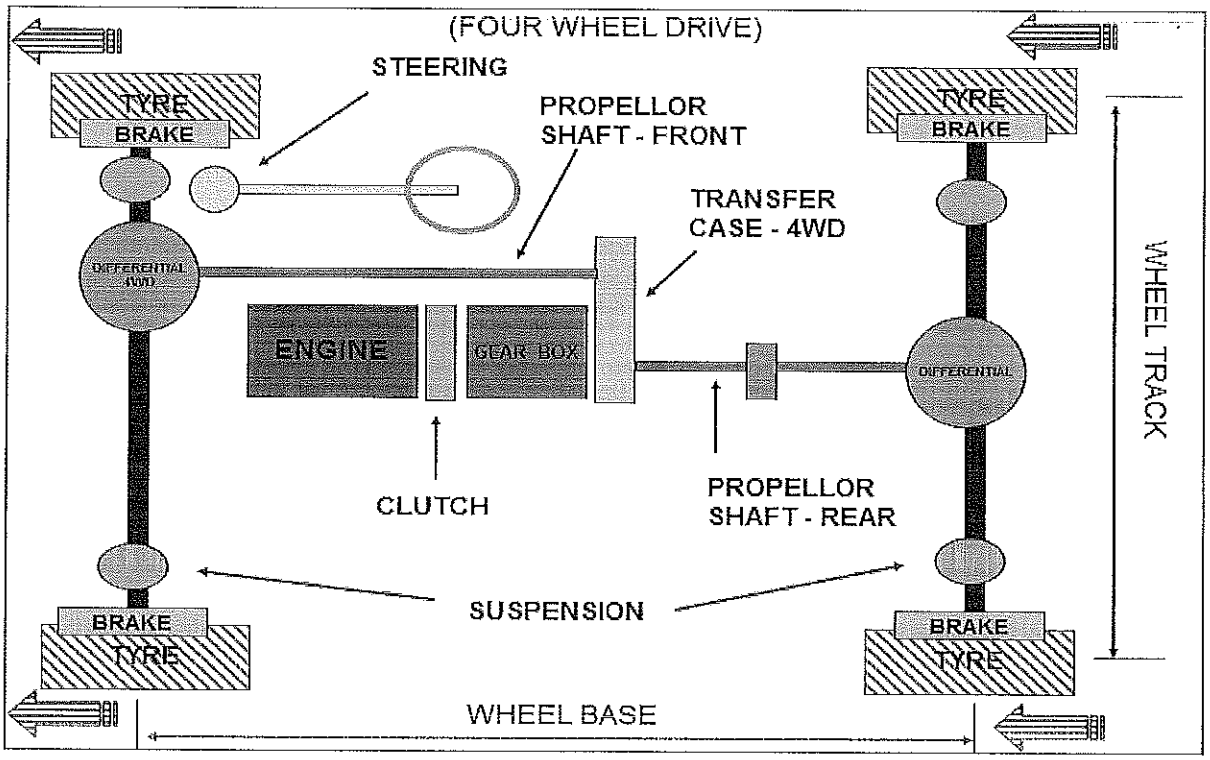
7) List the major components of IC engine.

Ans: - The major components of an IC engine are as follows:

- Cylinder
- Cylinder head
- Piston
- Piston rings
- Gudgeon pin
- Connecting Rod
- Crankshaft
- Crankcase

8) Draw a labelled diagram of 4-wheel drive vehicle.

Ans:



Section – C 03X03 = 09 Marks

9) Discuss the roles and responsibilities of an automotive technicians.

Ans: - Their roles and responsibilities are:

- Identify mechanical problems, often by using computerized diagnostic equipment.
- Test parts and systems to ensure that they are working properly.
- Follow checklists to ensure that all critical parts are examined.
- Perform basic care and maintenance, including changing oil, checking fluid levels, and rotating tires.
- Repair or replace worn parts, such as brake pads and wheel bearings.
- Disassemble and reassemble parts of Automotive Vehicles.
- Use testing equipment to ensure that repairs and maintenance are effective
- Explain to clients their automotive problems and the repairs done on their vehicles.

10) What are the various safety practices that must be followed in an automobile workshop?

Ans:

The various safety practices are as follows:

- Always wear a safety helmet in the workshop, especially when working under the vehicle.
- Wear cotton hand gloves when working or carrying out repairs or service on a vehicle.
- Wear face masks to cover your nose and mouth.
- Wear safety goggles when working under the vehicle.
- Do not wear rings, watches and loose clothes when working on a vehicle.
- Keep the shop floor clean and tidy.
- Wear safety shoes in the workshop.
- Use specific and tool for a specific job.

11) Explain the process of 4-stroke diesel engine with the help of a diagram.

Ans:

SUCTION STROKE: With the movement of the piston from T.D.C. to B.D.C. during this stroke, the inlet valve opens and the air at atmospheric pressure is drawn inside the engine cylinder; the exhaust valve however remains closed. This operation is represented by the line 5-1

COMPRESSION STROKE: The air drawn at atmospheric pressure during the suction stroke is compressed to high pressure and temperature as the piston moves from B.D.C. to T.D.C. Both the inlet and exhaust valves do not open during any part of this stroke. This operation is represented by 1-2

POWER STROKE OR EXPANSION STROKE: As the piston starts moving from T.D.C to B.D.C, the quantity of fuel is injected into the hot compressed air in fine sprays by the fuel injector and it (fuel) starts burning at constant pressure shown by the line 2-3. At the point 3 fuel supply is cut off. The fuel is injected at the end of compression stroke but in actual practice the ignition of the fuel starts before the end of the compression stroke. The hot gases of the cylinder expand adiabatically to point 4. Thus doing work on the piston.

EXHAUST STROKE: The piston moves from the B.D.C. to T.D.C. and the exhaust gases escape to the atmosphere through the exhaust valve. When the piston reaches the T.D.C. the exhaust valve closes and the cycle is completed. This stroke is represented by the line 1-5.

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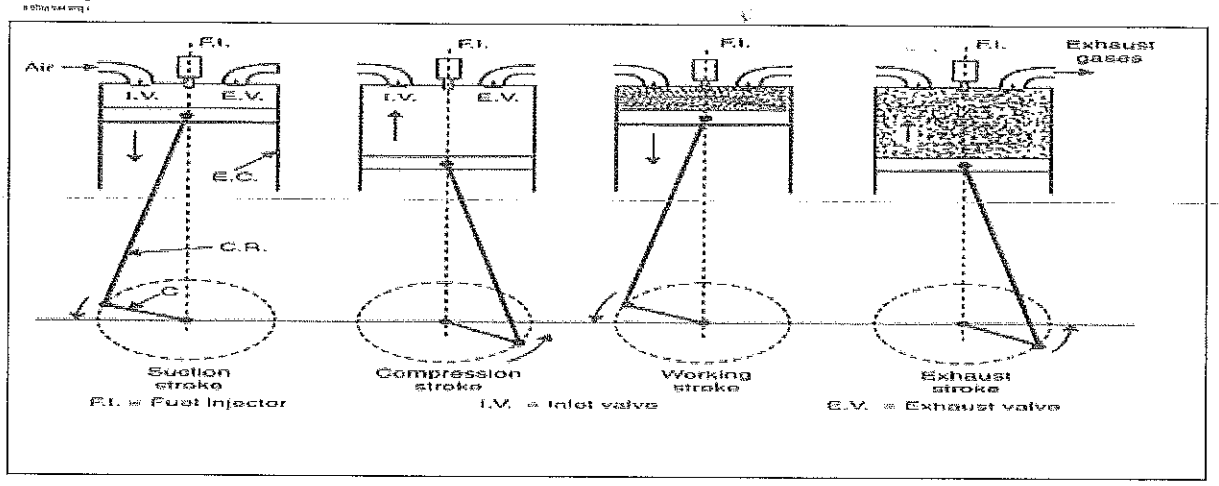

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, 1st In-Sem. Examination

B. Voc. Program, Winter Semester (2019-20)

Course Code: AUT1102 **Time: 1 Hour**

Course Name: Automotive Wheel Care and Steering System **Max. Marks: 20**

Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Answer all questions from section – B, each question carries two marks.
3. Answer all questions from section – C, each question carries three marks.

Section – A

05x01 = 05 Marks

Q 1. The purpose of wheel axle in a vehicle is:

A. To cool the engine.

B. To give power on fly-wheel.

C. To give structural support to wheels.

D. For air intake.

Q 2. TWI stands for:

A. Tyre Worn Indicator.

B. Tyre Wear Indicator.

C. Tread Worn Indicator.

D. Tread Wear Indicator.

Q 3. The machine which helps technician to dismount and mount tyres from a wheel is called:

A. Wheel Alignment.

B. Wheel Balancer.

C. Tyre Changer.

D. None of the above.

Q 4. Which material is used in manufacturing of wheel rims?

A. Plastic.

B. Fiber.

C. Pressed steel disc.

D. Copper.

Q 5. The ..... components should be checked for damage/wear in wheel alignment procedure.

A. Steering knuckles.
B. Ball joints.
C. Stabilizer shafts.
D. All of the above.

Section – B

03X02 = 06 Marks

Q 6. What are the roles and responsibilities of a wheel care technician in an automotive workshop?

Q 7. Name four different types of screwdrivers used in the wheel care section & explain them briefly.

Q 8. Write the names of PPEs (Personal Protective Equipment's) required during wheel balancing and tyre changing in the wheel care section?

Section – C

03X03 = 09 Marks

Q 9. Explain the following equipment:

a) Wheel Balancer.
b) Tyre Changer.
c) Wheel Aligner.

Q 10. Explain any six tools used in wheel care section with their applications.

Q 11. What are the steps involved to ensure accurate wheel alignment measurement?

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills
1st Semester, 1st In-Sem. Examination
B. Voc. Program, Winter Semester (2019-20)

Course Code: AUT1102 **Time: 1 hour**
Course Name: Automotive Wheel Care and Steering System **Max. Marks: 20**

Section – A

Q 1. The purpose of wheel axle in a vehicle is:
Answer – C. To give structural support to wheels.

Q 2. TWI stands for:
Answer – D. Tread Wear Indicator.

Q 3. The machine which helps technician to dismount and mount tyres from a wheel is called as:
Answer – C. Tyre Changer.

Q 4. Which material is used in manufacturing of wheel rims?
Answer – C. Pressed steel disc.

Q 5. The function of the _____ is to enhance the performance and provide better steering and vehicle stability.

Answer – B. Pitch.

Section – B

Q 6. What are the roles and responsibilities of a wheel care technician in an automotive workshop?

Answer – **Roles and responsibilities of technician in wheel care**

1. An automotive service technician (or auto mechanic) is someone who inspects, maintains, repair and replace like tyre, brake etc.
2. Test parts and systems to ensure they are working properly.
3. Identify mechanical problems, often by using computerized diagnostic equipment.
4. Follow checklists to ensure that all critical parts are examined.
5. Perform basic care of tyre rotations.
6. Repair or replace worn parts, such as brake pads and wheel bearings.
7. Disassemble and reassemble parts.
8. Use testing equipment to ensure that repairs and maintenance are effective.
9. Explain to clients their automotive problems and the repairs done on their vehicles.

Q 7. Name four different types of screwdrivers used in the wheel care section & define them briefly.

Answer –

- DIFFERENT TYPE OF SCREWDRIVER:

1. Slot Head – This is one of the most common types because it is the easiest screw to make. For this reason, just about anything you find that was created during the error where screws were handmade will have a slot head screw. Most people call this a flat head screw or flat head screwdriver.
2. Philips – Most people don't realize that a Phillips head screwdriver is designs for a specific task. It is designed to push the screwdriver out of the head when the screw is

tight. That's why you have trouble getting one into some materials that are extremely tough.

3. Pozidrive – A Pozidrive screw looks a lot list a Phillips head screw, but does not push your screwdriver out when tight. You can apply as much torque as you need without running into any problems.
4. Hexagon – Hex screwdrivers are some of the simplest and cheap to produce. This is why you will see them used in a lot of furniture you purchase from discount stores. They are easy to use, but do not provide you any insurance that you won't tighten them too much.
5. Torx – Just like the name implies, this head is designed to give you the most torque possible. It is designed a lot like the hex screws but it is designed to have more contact between the screwdriver and the screw, so the torque is distributed more evenly.

Q 8. Write the names of PPEs (Personal Protective Equipment's) required during wheel balancing and tyre changing in the wheel care section?

Answer –

- Safety goggles:

If you are working in workshop, then you should always wear safety glasses. Because some time stones, dust particles available on wheel and when wheel is rotating then it gone into your eyes so you must wear safety glasses with side protection.

- Safety gloves:

This type of glove can provide protection against some moderate concentrated chemicals. The risk of cuts and abrasions also can be minimized by wearing gloves.

- Helmet:

Helmet will protect the user's head against: impact from objects falling from above, by resisting and deflecting blows to the head.

- Safety shoes:

A steel-toe boot is protective reinforcement in the toe which protects the foot from falling objects or compression, usually combined with a mid-sole plate to protect against punctures from below.

Section – C

Q 9. Explain the following equipment:

a) Wheel Balancer.
b) Tyre Changer.
c) Wheel Aligner.

Answer a)– **Wheel Balancer**

1. Wheel balancing, also known as Tyre balancing, is the process of equalizing the weight of the combined tire and wheel assembly.
2. Wheel balancing is the process of balancing the weight of a tire and wheel assembly so that it travels evenly at high speeds.
3. Balancing requires putting a mounted wheel and tire on a balancer, which centers the wheel and spins it to determine where the weights should go.
4. Every time a wheel is first mounted onto a vehicle with a new tire, it has to be balanced.

5. The goal is to make sure the weight is evenly distributed throughout each of the wheels and tires on a vehicle. This process evens out heavy and light spots in a wheel, so that it rotates smoothly.
6. If there is even a slight difference in weight in the wheels, it will cause enough momentum to create a vibration in the car.

Answer b)- **Tyre Changer**

1. Tyre changer is a machine which is used to change or replace the tyre.
2. Tyre changer is a machine used to help technicians dismount and mount tires with automobile wheels.
3. Different tire changers allow technicians to replace tires on automobiles, motorcycles and heavy-duty trucks.
4. New tire and wheel technology has improved certain tire changers performance.

Answer c)- **Wheel Aligner**

1. Alignment refers to an adjustment of a vehicle's suspension – the system that connects a vehicle to its wheels. It is not an adjustment of the tires or wheels themselves.
2. The key to proper alignment is adjusting the angles of the tires which affects how they make contact with the road.
3. With caster and camber adjusted, then adjust toe angles. Restart the car, remove the steering wheel-lock, turn the steering wheel back and forth a couple times, then re-center and replace the steering wheel-lock. Recheck alignment specifications, and then readjust angles as necessary.

Q 10. Explain any six tools used in wheel care section except screwdrivers with their applications.

Answer –

1. **Open-end spanner:** This one-piece wrench is made double-ended with differing size openings for opposite faces of bolts or nuts. The U-shaped opening on each end provides grip for objects by flipping the wrench over to use the opposite side.
2. **Combination spanner:** The combination wrench is a multi-purpose tool with the open-end for tightening and loosening in small spaces and the box-end for leverage and a firm grip around nuts and bolts.
3. **Allen set:** These wrenches have L or T-shaped handles with hexagonal shaped ends matching openings to bolts or screws. Though they are small, they are typically used for pairing and holding objects together.
4. **Socket wrench:** Used to turn a fastener, a socket wrench has a socket (hollow cylinder) attached to the end of the handle that is fitted over nuts and bolts to tighten and loosen at many angle.
5. **Adjustable wrench:** If you don't have the right size of wrench for a project or repair, an adjustable wrench can save the day. Also known as a crescent wrench. It should only be used when necessary. Due to their versatility, they can tend to slip and slide along bolts when too much force is used.
6. **Slip joint pliers:** Slip joint pliers are pliers whose pivot point or fulcrum can be moved to increase the size range of their jaws. Most slip joint pliers use a mechanism that allows sliding the pivot point into one of several positions when the pliers are fully opened.

Q 11. What are the steps involved to ensure accurate wheel alignment measurement?

Answer –

1. Centre the vehicle on the alignment rack.
2. Push down on the front and rear bumper three times.
3. Install the alignment heads to the vehicle.
4. Select the program on the alignment equipment.
5. Compensate, level, and lock all of the alignment equipment.
6. Measure caster, camber & toe angles and record the same.

7. Compare the measurements to the specifications mentioned in the service manual.
8. As per the specifications, adjust the below as required:
    a. Adjust turning angle.
    b. Adjust front and rear camber as per the specs mentioned.
    c. Adjust the toe as the specs mentioned.
    d. Lower the vehicle from the alignment rack.

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Question Paper

School of Automotive Skills

1st Semester, 1st In-Sem. Examination

B. Voc. Program, Semester (2019-20)

Course Code: AUT1103 **Time: 1 Hour**

Course Name: Automotive Body Repairs

Max. Marks: 20

Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Answer all questions from section – B, each question carries two marks.
3. Answer all questions from section – C, each question carries three marks.

Section – A

Direction : Select the one correct option from the given options in the following questions : -

5x01 = 5 Marks

Q 1. What is the use of safety helmet?

A. To protect hair.
C. To protect ear.
B. To protect head.
D. None of the above

Q 2. What is the meaning of blue color in safety sign board in body shop?

A. prohibited.
C. None of these
B. warning.
D. obey

Q 3. While working on a car in body shop which of these should not be worn?

A. Tie, necklace, bangles etc.
C. glasses.
B. Safety helmet.
D. overhaul.

Q 4. Based on body type, which type of car is this?

A. Hatchback.
C. coupe.
B. Saloon.
D. None of the above.

Q 5. How many types of body sections we have in a vehicle?

A. 3

B. 2.

C. 1.

D. None of the above.

Section – B

3x2 = 6 Marks

Q 6. What are the Roles and Responsibilities of body shop technician?

Q 7. Draw six (6) safety symbols which are used in Body shop.

Q 8. What are the tools and equipment used in body shop with their applications?

Section – C

3x3 = 9 Marks

Q 9. What MPV stands for? What are the specifications of MPV?

Q 10. Explain three different car body sections.

Q 11. What is cabriolet? What are its specifications?

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Answer Sheet

School of Automotive Skills

1st Semester, 1st In-Sem. Examination

B. Voc. Program, Semester (2019-20)

Course Code: AUT1103 **Time: 1 Hour**

Course Name: Automotive Body Repair

Max. Marks: 20

Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Answer all questions from section – B, each question carries two marks.
3. Answer all questions from section – C, each question carries three marks.

Section – A

5x01 = 5 Marks

Q 1. What is the use of safety helmet?
Ans. (b) To protect head.

Q 2. What is the meaning of blue color in safety sign board in body shop?

Ans. (d) obey

Q 3. While working on car in body shop which of these should not be worn?

Ans. (a) Tie, necklace, bangles etc.

Q 4. Based on body type, which type of car is this?

Ans. (b) Saloon.

Q 5. How many type of body sections we have in a vehicle?
Ans. (a) 3

Section – B

3x2 = 6 Marks

Q 6 What are the Roles and Responsibilities of body shop technician?

Ans. An auto body repairer is someone who works in the automotive industry. They repair, restore, refinish, and replace vehicle bodies and frames, windshields, and window glass.

- An auto body technician can repair most damage from everyday vehicle collisions and make vehicles look and drive like new.

- Damage may be minor, such as replacing a cracked windshield, or major, such as replacing an entire door panel.
- They can do all body work.

Q 7. Draw six (6) safety symbols which are used in workshop.

Ans.

Q 8. What are the tools and equipment used in body shop with its applications?

Ans. There are many tools and equipment used in Body Repair Shop, some of them are;

- Pneumatic tools
- Dent puller
- Grinder
- Metal-cutting guns
- Plasma cutters
- Heavy-duty hydraulic jacks
- Hammers & Mallet
- Files, pliers, wrenches, and screwdrivers.

Section – C

3x3 = 9 Marks

Q 9. What MPV stands for? What are the specifications of MPV?

- Ans. A MPV refers to a Multi-Purpose Vehicle and commonly feature a one or two box design and are taller than station wagons.
- Designed to be spacious; they usually include three rows of seats with seating for 7 or more.

Highlights:	**Best for:**
Multi-purpose vehicle	7 seaters and more
Spacious & flexible interior	Use for multi-purpose

Plenty of storage space throughout the cabin.

e.g. Toyota Innova, Mahinda XUV 500, Scorpio

Q.10 Explain three different car body sections.

Ans. Car body section are divided into major three section:

- Front section- Front section includes everything between front bumper and fire wall. Also called nose section, front clip, "doghouse"
- Mid-section- Center section or Mid-section includes body parts that form passenger compartment. Also called a "greenhouse"
- Rear section- Rear section also called tail section, rear clip, "cathouse"

Q 11. What is cabriolet? What are its specification?

Ans. A convertible or cabriolet is a body style with a foldable or retractable roof.

- Such cars often have canvas or vinyl roofs, though nowadays these are also made of plastic, aluminum or steel.
- Convertibles are usually two-door cars.

Highlights:	**Best for:**
Open-roof driving	Great enjoyment in a sunny day
All-round visibility	
Enhanced driving pleasure	
Maximized ventilation	
e.g. BMW Z4	

BSDU

Registration No: .....

SCHOOL OF AUTOMOTIVE SKILLS

FIRST IN-SEMESTER EXAMINATION – ~~2019-2020~~ 2018-19

WINTER SEMESTER, B. VOC. PROGRAM

Course Code: AUT1104 **Time: 1 Hour**

Course Name: AUTOMOTIVE SPRAY PAINTING **Max. Marks: 20**

Instructions: Attempt all questions

Section-A

Direction : Choose the correct option for each of the following questions : -

Q-1. The full form of HVLP is:

a. High Velocity Low Pressure
b. High Viscosity Low Paint
c. High Volume Low Pressure
d. None of these

Q-2. Where one should mix the paint while working in a paint shop?

a. Inside Paint booth
b. Paint mixing room
c. Outside paint booth
d. None of the above

Q-3. What is the name of the equipment which provides a controlled environment required for final painting of a car panel?

a. Paint booth
b. Sanding room
c. Paint mixing room
d. None of the above

Q-4. The respiratory mask is a safety gear which is not used during:

a. Dry Sanding of the Panel
b. Primer application
c. Top coat application
d. Clear coat application

Q-5. Which one of these is not a benefit of a Paint Mixing Room?

a. Waste reduction
b. Versatility
c. Time Saving
d. Good Quality Finish

Section-B

3x2=6 Marks

Q-6. What are the jobs and responsibilities of a paint shop technician in an Automotive Workshop?

Q-7. What personal protective equipments are essential to use during dry sanding process and why?

Q-8. What is an infrared drier? What are the conditions in which it must be used for different film thickness?

Section-C

3x3=9 Marks

Q-9. Explain the hazards which can be caused if mandatory cautions are not taken while working in a paint shop?

Q-10. Discuss the different types of paint booths based on its construction, air flow and type of paint which a paint booth can handle.

Q-11. Discuss about the different types of spray guns and their applications, based on their feeding mechanism and nozzle sizes.

BSDU

Registration No: .....

SCHOOL OF AUTOMOTIVE SKILLS

FIRST IN-SEMESTER EXAMINATION – 2019-2020

WINTER SEMESTER, B. VOC. PROGRAM

Course Code: AUT1104 **Time: 1 Hour**

Course Name: AUTOMOTIVE SPRAY PAINTING **Max. Marks: 20**

Instructions: Attempt all questions

Section-A

Direction : Choose the correct option for each of the following questions : -

Q-1. The full form of HVLP is:

a. High Velocity Low Pressure
b. High Viscosity Low Paint
c. **High Volume Low Pressure**
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a. **Dry Sanding of the Panel**
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Q-5. Which one of these is not a benefit of a Paint Mixing Room?

a. Waste reduction
b. Versatility
c. Time Saving
d. **Good Quality Finish**

Section-B

3x2=6 Marks

Q-6. What are the jobs and responsibilities of a paint shop technician in an Automotive Workshop?

- Job- They paint new cars, repair the paint jobs on old or damaged cars and create customised paint jobs for customers.
- Responsibility-
  - To carry all types of vehicle body refinishing work like:-
    1. Pre -paint preparation
    2. Priming and painting
    3. Paint inspection
    4. Rectification of defects
  - To identify and utilise the correct methods of working by using your experience, skills, training and industry knowledge,
  - To keep your skills up-to-date by making appropriate efforts to acquire adequate knowledge of new vehicles.
  - To identify and report all apparent faults considered to be advisable in the interest of safety and reliability.

Q-7. What personal protective equipments are essential to use during dry sanding process and why?

- Dust Mask- to prevent dust and powder inhaling produced during the dry sanding of putty
- Ear Plugs- to prevent the fine particles of dust entering the ear causing ear infection
- Safety goggles- to prevent the dust particles entering eyes which can cause irritation in eyes
- Gloves- to prevent direct contact with putty which can cause skin allergy

Q-8. What is an infrared drier? What are the conditions in which it must be used for different film thickness?

- **It is a radiant energy/ electromagnetic radiation like X-rays and UV rays.**
- **It is divided into three parts:-**
  - **Short wave:- less than 2 microns.**
  - **Medium wave:- between 2 and 4 microns.**
  - **Long wave:- above 4 microns**

Section-C

3x3=9 Marks

Q-9. Explain the hazards which can be caused if mandatory caution is not taken while working in a paint shop?

- Interior Painting Safety Hazards :
  - Inadequate ventilation is the first and foremost hazard when painting indoors..
  - Take care when placing appropriate warning signs for people place them at a level and in a position where the majority of people can see them easily.

- Fire and explosion hazards
    - One of the major safety concerns associated with spray application is the combustible , flammable vapours and mists.
    - It is important to ensure that all potential sources of ignition have been removed prior to spraying flammable and combustible products.

Q-10. Discuss the different types of paint booths based on its construction, air flow and type of paint which a paint booth can handle.

- Based on construction-
    - Non- Ducted paint booth- without any inlet air blowers and exhaust blowers, lower in cost, open from atleast one side.
    - Directly Ducted paint booth- closed from all sides with ducts for inlet air blowers and exhaust blowers, can give better quality of finish
- Air Flow-
    - Downward flow- fresh air inlet is from the top/roof of paint booth and exhaust through filters is from the bottom of the paint booth, most commonly used type of paint booth.
    - Sideways flow- fresh air inlet from the side wall of paint booth, exhaust through opposite wall of air inlet.
- Type of paint-
    - Solvent based- capable of handling solvent based paints only comes with burners and heating mechanism for baking of panels after painting.
    - Water Borne based- capable of handling water-borne paints only comes with air blowers for drying of panels after painting.
    - Combi type- capable of handling both solvent based and water-borne paints having arrangements for both baking and air drying.

Q-11. Discuss about the different types of spray guns and their application, based on their feeding mechanism and nozzle sizes.

1. Cup spray guns

- Cup sprayers are airless powered spray guns useful primarily for crafts and hobbies.
- They provide a quick and even paint surface, and are very convenient to use.
- A small electric pump forces paint through the gun onto the surface.

2. Air spray guns

- Air spray guns use compressed air to spray paint onto a surface.
- To use an air spray gun, always mask the surrounding area and spray from a distance of 6 to 12 inches.
- These guns are ideal for high quality jobs, such as automotive work.

3. Airless spray guns

- They are suitable for large exterior and interior paint jobs.
- They operate under high pressure and work with a variety of paint types.
- Users should mask the surrounding area and should paint from a distance of 12 inches.

4. HVLP spray guns

- HVLP stands for high-volume, low-pressure.

- These guns use high volume of air to push the paint through the nozzle.
- Dilute the paint to make it thinner, and spray from a distance of five to eight inches.

Tip size	Commonly used for
0.8	Parting Films – PVA – very fine mist
1.2	Clear Coats – super fine finishes
1.4	Clear , base coats and single stage paints
1.6	General Purpose – light to heavy viscosity materials
1.8	Primers – will apply primer quickly
2.2-2.5	Gel Coats and Resins – for thick resins and not paints

Registration No.: .....

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skill

I Semester, 1st In-Sem. Examination

B. Voc. Program, Winter Semester (2019-20)

Course Code : AUT1105 **Time : 1 Hour**

Course Name: Automotive Electrical Fundamental & AC **Max. Marks : 20**

Instructions:

1. Answer all questions from section A, each question carries one mark.
2. Answer all questions from section B, each question carries two mark.
3. Answer all questions from section C, each question carries three mark.

Section – A

05X01 = 05 Marks

1. Heat is absorbed by the refrigerant, during the refrigeration cycle in a:
   a. Compressor.
   b. Condenser.
   c. Expansion Valve.
   d. Evaporator.

2. Which refrigerant is also known as R-718?
   a. NH_3
   b. Air
   c. H_2O
   d. $S0_2$

3. In VCRS cycle, Isentropic process takes place in which of the following equipment?
   a. Compressor.
   b. Condenser.
   c. Expansion Valve.
   d. Evaporator.

4. Which thermodynamic process takes place in Evaporator?
   a. Isentropic Compression.
   b. Constant Pressure heat addition.
   c. Isentropic Expansion.
   d. Constant Pressure heat rejection.

5. Refrigerant is found in which phase in VCRS cycle?
   a. Liquid alone.
   b. Vapor alone.
   c. Liquid and Vapor both.
   d. Solid and Vapor both.

Section – B

03X02 = 06 Marks

1. What are the SI units of the following entities?
    a. Temperature.
    b. Pressure.
    c. Heat.
    d. Work.
2. Define Sensible heat and Latent heat.
3. Write about the working of a reciprocating compressor with the help of a diagram.

Section – C

03X03 = 09 Marks

1. Derive the chemical composition of the following refrigerants:
    a. R-12
    b. R-134
2. Explain VCRS cycle and its components with the help of a neat sketch.
3. Discuss the different types of evaporators. Write briefly about working of each of them.

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School of Automotive Skill

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Section – A

05X01 = 05 Marks

1. Heat is absorbed by the refrigerant, during the refrigeration cycle in a:

   a. Compressor.
   b. Condenser.
   c. Expansion Valve.
   d. Evaporator.

Ans. d. Evaporator.

2. Which refrigerant is also known as R-718?

   a. NH_3
   b. Air
   c. H_2O
   d. $S0_2$

Ans. c. H_20.

3. In VCRS cycle, Isentropic process takes place in which of the following equipment?

   a. Compressor.
   b. Condenser.
   c. Expansion Valve.
   d. Evaporator.

Ans. a. Compressor.

4. Which thermodynamic process takes place in Evaporator?

   a. Isentropic Compression.
   b. Constant Pressure heat addition.
   c. Isentropic Expansion.
   d. Constant Pressure heat rejection.

Ans. b. Constant Pressure heat addition.

5. Refrigerant is found in which phase in VCRS cycle
    a. Liquid alone.
    b. Vapor alone.
    c. Liquid and Vapor both.
    d. Solid and Vapor both.

Ans. c. Liquid and Vapor both.

Section – B

03X02 = 06 Marks

1. What are the SI units of the following entities?
    a. Temperature.
    b. Pressure.
    c. Heat.
    d. Work.

Ans. a. Temperature: °C
b. Pressure : Bar
c. Heat : Joules
d. Work : Joules

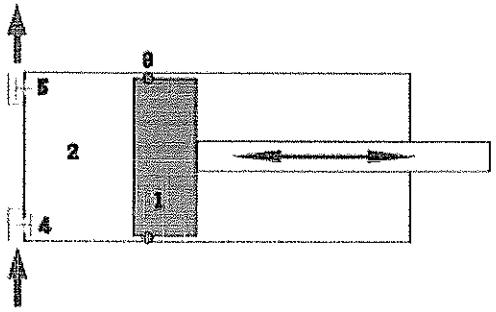
2. Define Sensible heat and Latent heat.

Ans. **Sensible Heat:** Sensible heat is the amount of thermal energy that is required to change the temperature of an object.

Latent Heat: The quantity of heat absorbed or released by a substance undergoing a change of state, such as ice changing to water or water to steam, at constant temperature and pressure.

3. Write about the working of a reciprocating compressor with the help of a diagram.

Ans. A reciprocating compressor or piston compressor is a positive-displacement compressor that uses pistons driven by a crankshaft to deliver gases at high pressure. The intake gas enters the suction manifold, then flows into the compression cylinder where it gets compressed by a piston driven in a reciprocating motion via a crankshaft, and is then discharged. Applications include oil refineries, gas pipelines, chemical plants, natural gas processing plants and refrigeration plants. One specialty application is the blowing of plastic bottles made of polyethylene terephthalate (PET).



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Section – C

03X03 = 09 Marks

1. Derive the chemical composition of the following refrigerants:
   a. R-12
   b. R-134

Ans.

a. R-12

Can also be written as R-012

Comparing it with $R-(m-1)(n+1)P$

So, $m-1=0 \Rightarrow m=1$

$n+1=1 \Rightarrow n=0$

$P=2$

We know, $n+p+q=2m+2$

∴ Substituting all the values in above eqn, we get

$q=2(1)+2-0-2$

$=2$

∴ Chemical formula of R-12 is $C_mH_nF_pCl_q$

i.e. CF_2Cl_2

b. R-134

Comparing with $R-(m-1)(n+1)P$

$m-1=1 \Rightarrow m=2$

$n+1=3 \Rightarrow n=2$

$P=4$

We know: $n+p+q=2m+2 \Rightarrow q=2(2)+2-2-4$

$\therefore q=0$

∴ Chemical formula for R-134 is $C_mH_nF_pCl_q$

i.e. $C_2H_2F_4$

2. Explain VCRS cycle and its components with the help of a neat sketch.

Ans. Vapor Compression Refrigeration system have 4 main components, using which lower temperatures is being produced and maintained:

1. Compressor
2. Condenser
3. Expansion valve
4. Evaporator.

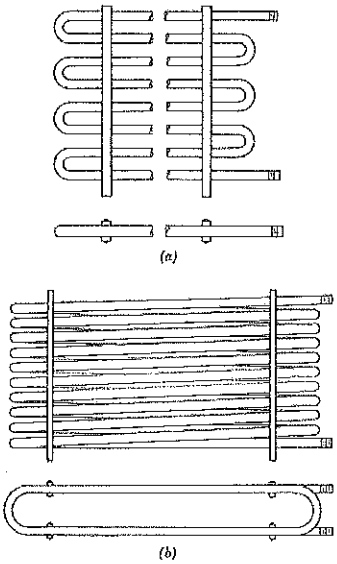
Low pressure, low temperature liquid is converted to vapor in the evaporator, thus absorbing heat the latent heat from the refrigerated space and keeping that space cool. The fluid is driven around the cycle by the compressor, which compresses the low temperature, low pressure vapor leaving the evaporator to high pressure, high temperature vapor. That vapor is condensed to liquid in the condenser, thus giving off heat at a high temperature to the surrounding environment. Finally, the high pressure, high temperature liquid leaving the condenser is cooled and reduced in pressure by passing it through an expansion valve. This provides the input to the evaporator which was the first step of the cycle described above.

3. Discuss the different types of evaporator. Write briefly about working of each of them.

Ans.

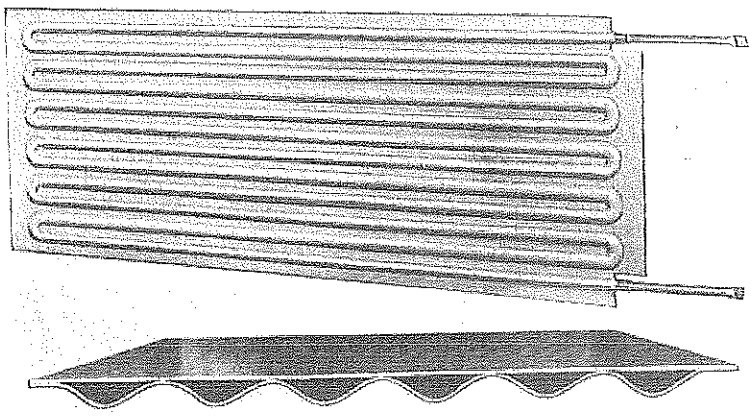
1) Bare Tube Evaporators:

The bare tube evaporators are made up of copper tubing or steel pipes. The copper tubing is used for small evaporators where the refrigerant other than ammonia is used, while the steel pipes are used with the large evaporators where ammonia is used as the refrigerant. The bare tube evaporator comprises of several turns of the tubing, though most commonly flat zigzag and oval trombone are the most common shapes. The bare tube evaporators are usually used for liquid chilling. In the blast cooling and the freezing operations the atmospheric air flows over the bare tube evaporator and the chilled air leaving it used for the cooling purposes. The bare tube evaporators are used in very few applications, however the bare tube evaporators fitted with the fins, called as finned evaporators are used very commonly.



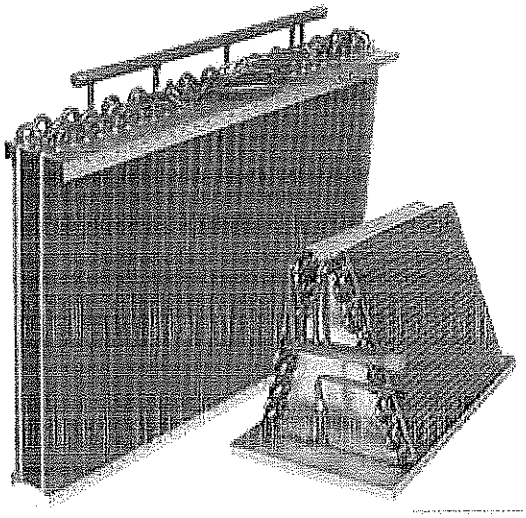
2) Plate Type of Evaporators:

In the plate type of evaporators, the coil usually made up of copper or aluminium is embedded in the plate so as so to form a flat looking surface. Externally the plate type of evaporator looks like a single plate, but inside it there are several turns of the metal tubing through which the refrigerant flows. The advantage of the plate type of evaporators is that they are more rigid as the external plate provides lots of safety. The external plate also helps increasing the heat transfer from the metal tubing to the substance to be chilled. Further, the plate type of evaporators are easy to clean and can be manufactured cheaply.



3) Finned Evaporators

The finned evaporators are the bare tube type of evaporators covered with the fins. When the fluid (air or water) to be chilled flows over the bare tube evaporator lots of cooling effect from the refrigerant goes wasted since there is less surface for the transfer of heat from the fluid to the refrigerant. The fluid tends to move between the open spaces of the tubing and does not come in contact with the surface of the coil, thus the bare tube evaporators are less effective. The fins on the external surface of the bare tube evaporators increases the contact surface of the of the metallic tubing with the fluid and increase the heat transfer rate, thus the finned evaporators are more effective than the bare tube evaporators.



4) Shell and Tube types of Evaporators

The shell and tube types of evaporators are used in the large refrigeration and central air conditioning systems. The evaporators in these systems are commonly known as the chillers. The chillers comprise of large number of the tubes that are inserted inside the drum or the shell. Depending on the direction of the flow of the refrigerant in the shell and tube type of chillers, they are classified into two types: dry expansion type and flooded type of chillers. In dry expansion chillers the refrigerant flows along the tube side and the fluid to be chilled flows along the shell side. The flow of the refrigerant to these chillers is controlled by the expansion valve. In case of the flooded type of evaporators the refrigerant flows along the shell side and fluid to be chilled flows along the tube. In these chillers the level of the refrigerant is kept constant by the float valve that acts as the expansion valve also.

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, 1stIn-Sem. Examination

B. Voc. Program, Winter Semester (2019-20)

Course Code: AUT1106 **Time: 1 Hour**

Course Name: Automotive tools and measurement **Max. Marks: 20**

Instructions:

1. Attempt all questions from section-A and each question carries 1 mark.

2. Attempt all questions from section-B and each question carries 2 marks.

3. Attempt all questions from section-C and each question carries 3 marks.

Section – A

05X01 = 05 Marks

Q-1. The least count defines the.....

a. Smallest unit we can measure
c. Smallest length
b. Smallest dimension
d. None of these

Q-2. Which type of measurement does not provide numerical values?

a. Gauging
c. Both (A) & (B)
b. Measuring
d. None of the above

Q-3. In engineering drawing second & fourth angle projections are not used because of:

a. Overlapping
c. Lacking
b. Complications
d. None of the above

Q-4. Which one of the following ratios represents the reducing scale?

a. 1:1
c. 2:1
b. 1:2
d. 10:2

Q-5. Which value can be the reading of an instrument having least count = 20μm ?

a. 20.05
c. 20.06
b. 20.062
d. 20.006

Section – B

03X02 = 06 Marks

Q-6. Mention the parameters required during selection of measuring tools.

Q-7. Write at least 4 differences between tools and equipments.

Q-8. What is meant by fit? Name different types of fits.

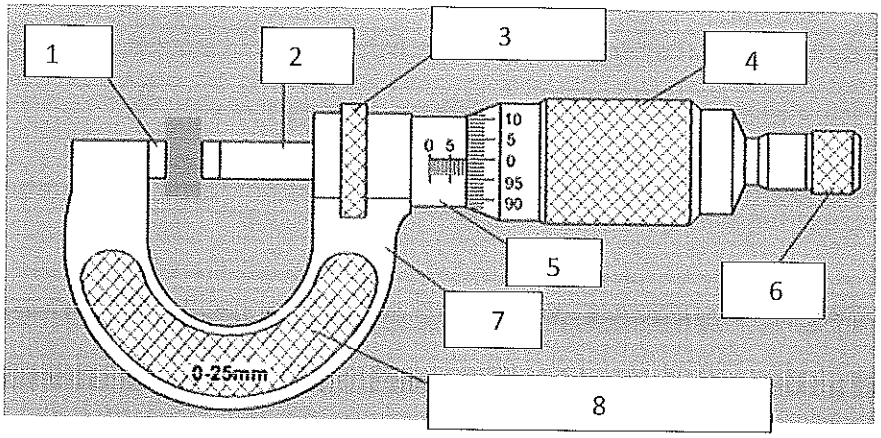
Section – C

03X03 = 09 Marks

Q-9. Write a short note on spanners.

Q-10. Define calibration. Write down different types of errors associated with Vernier caliper?

Q-11. Name the different parts of the following measuring instrument:



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3. Attempt all questions from section-C and each question carries 3 marks.

Section – A

05X01 = 05 Marks

Q-1. The least count defines the.....

a. Smallest unit we can measure
c. Smallest length
b. Smallest dimension
d. None of these

Answer: a

Q-2. Which type of measurement does not provide numerical values?

a. Gauging
c. Both (A) & (B)
b. Measuring
d. None of the above

Answer: a

Q-3. In engineering drawing second & fourth angle projection are not use because of:

a. Overlapping
c. Lacking
b. Complications
d. None of the above

Answer: a

Q-4. Which of the following ratios represents the reducing scale?

a. 1:1
c. 2:1
b. 1:2
d. 10:2

Answer: b

Q-5. Which value can be the reading of instrument having least count = 20μm ?

a. 20.05
c. 20.06
b. 20.062
d. 20.006

Answer: c

Section – B

03X02 = 06 Marks

Q-6. Mention the parameters required during selection of measuring tools.

Answer:

1. Range of measuring instrument.

2. Type of measurement linear or circular.
3. Least count of instrument.

Q-7. Write at least 4 difference between tools and equipment's.

Answer:

Tools that are used in particular fields or activities may have different designations such as "instrument", "utensil", "implement", "machine", "device," or "apparatus". The set of **tools** needed to achieve a goal is "**equipment**". The knowledge of constructing, obtaining and using **tools** is technology.

Q-8. What is meant by fit? Name different types of fits.

Answer:

The relationship between the two mating parts that are to be assembled, that is, the hole and the shaft, with respect to the difference in their dimensions before assembly is called a fit.

An ideal fit is required for proper functioning of the mating parts. Three basic types of fits can be identified, depending on the actual limits of the hole or shaft:

a. **Clearance fit**
b. **Interference fit**
c. **Transition fit**

Section – C

03X03 = 09 Marks

Q-9. Write a short note on spanners.

Answer:

Spanners are used for operating:

- Threaded Fasteners
- Bolts
- Nuts

- Spanners are made with jaws or opening that fit square or hexagonal nuts and bolts and screw heads.
- They are made of High Tensile or alloy steel
- They are drop forged and heat treated for strength
- They are given a smooth surface finish for easy gripping

The basic types of spanners are:

- Open end spanners
- Tube or tubular box spanners
- Socket Spanners
- Ring Spanners

- The correct spanner to use is the one that fits exactly and allows room for use
- They should also permit the job to be done in shorter time

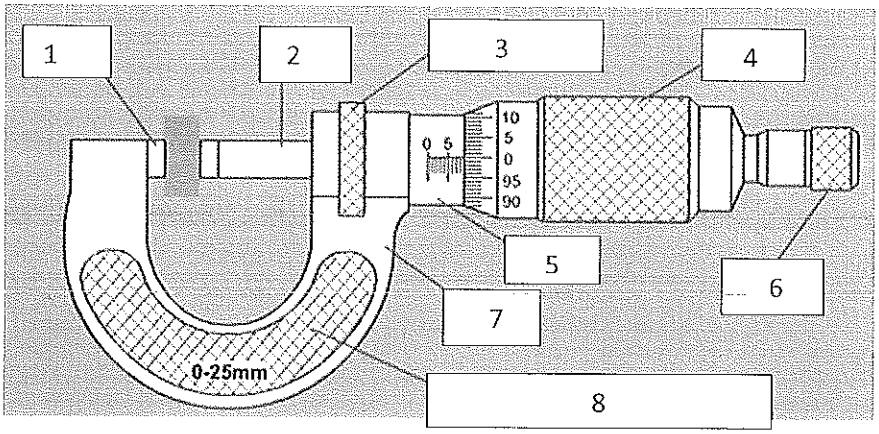
Q-10. Define calibration. Write down different types of errors associated with Vernier caliper?

Answer: Calibration is the process of configuring an instrument to provide a result for a sample within an acceptable range.

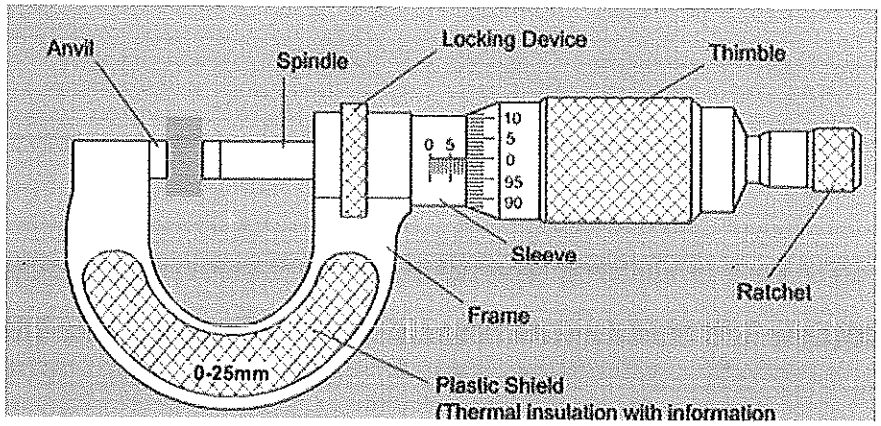
Errors of Vernier caliper

1. Parallax error
2. Tilt error
3. Cocking
4. Dirt and burrs on the work piece
5. Dirt on measuring instrument

Q-11. Name the different parts of the following measuring instrument:


1
2
3
4
5
6
7
8
0-25mm
0 5
10
5
0
95
90

Answer:


Anvil
Spindle
Locking Device
Thimble
Sleeve
Ratchet
Frame
0-25mm
Plastic Shield
(Thermal insulation with information
0 5
10
5
0
95
90