



Registration No.:

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, End-Semester Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT1101

Time: 3 Hours

Course Name: Automotive Power Train, Chassis & Suspension

Max. Marks: 100

Instructions:

1. Answer all questions from “**Section-A**”, each question carries 01 mark.
2. Answer any **Six** questions from “**Section-B**”, each question carries 05 marks.
3. Answer all questions from “**Section-C**”, each question carries 10 marks.

Section – A

Directions: Select any one correct answer from the given options: 20X01 = 20 Marks

- 1) (i) Catalytic converter is the component of system.
 - a) Fuel
 - b) Intake
 - c) Exhaust
 - d) All of the above(ii) The motion of the cam is transferred to the valves through.....
 - a) Piston
 - b) Rocker arm
 - c) Crank shaft
 - d) Cam shaft
- 2) (i) If the Air-Fuel mixture in the spark ignition engine is too rich, then Air-Fuel ratio is about:
 - a) 17:1
 - b) 15:1
 - c) 13:1
 - d) 10:1(ii) In a single plate clutch, torsional vibrations are absorbed by:
 - a) Coil springs known as torsional springs
 - b) Shock absorbers
 - c) Leaf springs
 - d) All of the above
- 3) (i) The correct flow of power through the drive train is:
 - a) Engine, gearbox, clutch, differential, wheels
 - b) Engine, differential, clutch, gearbox, wheels
 - c) Engine, clutch, differential, gearbox, wheels
 - d) Engine, clutch, gearbox, differential, wheels(ii) The hydraulic braking system works on the principle of:
 - a) Joule's laws
 - b) Gas laws
 - c) Pascal's laws
 - d) Newton's laws

- 4) (i) In a four stroke engine each cylinder has
- | | |
|---------------|-----------------|
| a) One valve | c) Three valves |
| b) Two valves | d) Five valves |
- (ii) The type of air cycle used petrol engine is:
- | | |
|-----------------|-----------------|
| a) Diesel cycle | c) Otto cycle |
| b) Dual cycle | d) Carnot Cycle |
- 5) (i) The device which maintains the speed of an engine is known as
- | | |
|--------------|-------------|
| a) Cam shaft | c) Gearbox |
| b) Clutch | d) Flywheel |
- (ii) A machine member used to connect engine shaft and gear box is called:
- | | |
|-------------|-----------------|
| a) Flywheel | c) Clutch |
| b) Gear box | d) Differential |
- 6) (i) is a device that changes the speed, torque and the direction of a power source.
- | | |
|---------------------|-----------|
| a) Torque converter | c) Piston |
| b) Booster | d) Gear |
- (ii) Propeller shaft is used to transmit power from engine to gear box.
- | | |
|----------|------------------|
| a) True | c) a) & b) |
| b) False | d) None of these |
- 7) (i) Four-wheel drive vehicles have differential on:
- | | |
|-----------------|-------------------------------|
| a) Front wheels | c) Both front and rear wheels |
| b) Rear wheels | d) All of the above |
- (ii) A gear which converts rotational motion into linear is called:
- | | |
|---------------|-------------------------|
| a) Spur gear | c) Helical gear |
| b) Bevel gear | d) Rack and pinion gear |
- 8) (i) is used for reducing the speed and increasing the torque.
- | | |
|-------------------------|---------------------------|
| a) Worm gear | c) Sun and planetary gear |
| b) Rack and pinion gear | d) Bevel gear |
- (ii) The is used to change the direction of rotation of the output shaft.
- | | |
|---------------|---------------------|
| a) Bevel gear | c) Idler gear |
| b) Spur gear | d) All of the above |
| e) | |
- 9) (i) system removes the excessive heat of combustion from the engine.
- | | |
|----------------------------|-------------------|
| a) Cooling system | c) Exhaust system |
| b) Air conditioning system | d) Intake system |
- (ii) is the temperature sensitive valve fitted on outlet of the engine.
- | | |
|----------------|------------------|
| a) Thermometer | c) Thermostat |
| b) Tachometer | d) None of these |
- 10) (i) Centrifugal clutch is used in a.....
- | | |
|------------|---------------------|
| a) Car | c) Truck |
| b) Scooter | d) All of the above |
- (ii) is not common between the petrol and diesel engines.
- | | |
|---------------|-------------|
| a) Air filter | c) Radiator |
| b) Thermostat | d) injector |

Section – B

06X05 = 30 Marks

- 11) What are the major functions of differential?
- 12) Draw an anatomy of four-wheel drive of an automobile.
- 13) Write the classification of clutch.
- 14) What are the differences between single and multi-plate clutch?
- 15) State Pascal's Law with the help of a diagram.

- 16) Mention the characteristics of brake fluid.
- 17) Write the advantages and disadvantages of helical gear over spur gear.
- 18) What are the safety equipment used in mechanical shop? Write their names & advantages.

Section – C

05X10 = 50 Marks

- 19) Discuss the general servicing procedures of a vehicle.
- 20) Explain the working principle of clutch with the help of a labeled diagram.
- 21) Discuss the modification in synchromesh gear box with the help of a diagram.
- 22) Explain the working of Anti-Lock Braking System with the help of a block diagram.
- 23) Describe the working of four stroke diesel engine.

**BHARTIYA SKILL DEVELOPMENT UNIVERSITY****School of Automotive Skills****1st End-Semester Examination****B. Voc. Program, Summer Semester (2018-19)****Course Code: AUT1101****Time: 3 Hours****Course Name: Automotive Power Train, Chassis & Suspension****Max. Marks: 100****Instructions:**

1. Answer all questions from "**Section-A**", each question carries 01 mark.
2. Answer any **Six** questions from "**Section-B**", each question carries 05 marks.
3. Answer all questions from "**Section-C**", each question carries 10 marks.

Section – A**Directions:** Select any one correct answer from the given options: 20X01 = 20 Marks

1) (i) Catalytic converter is the component of system.

- | | |
|-----------|---------------------|
| a) Fuel | c) Exhaust |
| b) Intake | d) All of the above |

Ans: - c)

(ii) The motion of the cam is transferred to the valves through.....

- | | |
|---------------|----------------|
| a) Piston | c) Crank shaft |
| b) Rocker arm | d) Cam shaft |

Ans: - b)

2) (i) If the Air-Fuel mixture in the spark ignition engine is too rich, then Air-Fuel ratio is about

- | | |
|---------|---------|
| a) 17:1 | c) 13:1 |
| b) 15:1 | d) 10:1 |

Ans: - d)

(ii) In a single plate clutch, torsional vibrations are absorbed by

- | | |
|--|---------------------|
| a) Coil springs known as torsional springs | c) Leaf springs |
| b) Shock absorbers | d) All of the above |

Ans: - a)

3) (i) The correct flow of power through the drive train is

- | | |
|--|--|
| a) Engine, gearbox, clutch, differential, wheels | c) Engine, clutch, differential, gearbox, wheels |
| b) Engine, differential, clutch, gearbox, wheels | d) Engine, clutch, gearbox, differential, wheels |

Ans: - d)

(ii) The hydraulic braking system is work on the principle of

- a) Joule's laws
- b) Gas laws
- c) Pascal's laws
- d) Newton's laws

Ans: c)

4) (i) In a four stroke engine each cylinder has

- a) One valve
- b) Two valves
- c) Three valves
- d) Five valves

Ans: - b)

(ii) The type of air cycle used petrol engine is

- a) Diesel cycle
- b) Dual cycle
- c) Otto cycle
- d) Carnot Cycle

Ans: - c)

5) (i) The device which maintain the speed of an engine is known as

- a) Cam shaft
- b) Clutch
- c) Gearbox
- d) Flywheel

Ans: - d)

(ii) A machine member used to connect engine shaft and gear box is called

- a) Flywheel
- b) Gear box
- c) Clutch
- d) Differential

Ans: - c)

6) (i) is a device that changes the speed, torque and the direction of a power source.

- a) Torque converter
- b) Booster
- c) Piston
- d) Gear

Ans: - d)

(ii) Propeller shaft is used to transmits power from engine to gear box.

- a) True
- b) False
- c) a) & b)
- d) None of these

Ans: - b)

7) (i) Four-wheel drive vehicles have differential on

- a) Front wheels
- b) Rear wheels
- c) Both front and rear wheels
- d) All of the above

Ans: - c)

(ii) A gear which converts rotational motion into linear is called

- a) Spur gear
- b) Bevel gear
- c) Helical gear
- d) Rack and pinion gear

Ans: - d)

8) (i) is used for reducing the speed and increasing the torque.

- a) Worm gear
- b) Rack and pinion gear
- c) Sun and planetary gear
- d) Bevel gear

Ans: - a)

(ii) The is used to change the direction of rotation of the output shaft.

- a) Bevel gear
- b) Spur gear
- c) Idler gear
- d) All of the above

Ans: - c)

- 9) (i) system removes the excessive heat of combustion from the engine.
- | | |
|----------------------------|-------------------|
| a) Cooling system | c) Exhaust system |
| b) Air conditioning system | d) Intake system |

Ans: - a)

- (ii) is the temperature sensitive valve fitted on outlet of the engine.
- | | |
|----------------|------------------|
| a) Thermometer | c) Thermostat |
| b) Tachometer | d) None of these |

Ans: - c)

- 10) (i) Centrifugal clutch is used in a.....
- | | |
|------------|---------------------|
| a) Car | c) Truck |
| b) Scooter | d) All of the above |

Ans: - b)

- (ii) is not common between the petrol and diesel engines.
- | | |
|---------------|-------------|
| a) Air filter | c) Radiator |
| b) Thermostat | d) injector |

Ans: - d)

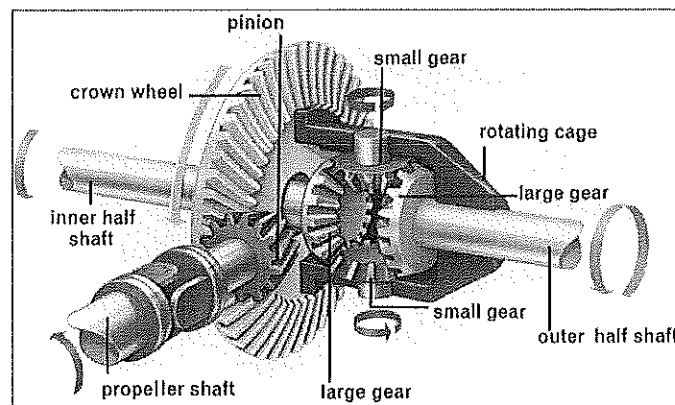
Section – B

06X05 = 30 Marks

11) What are the major functions of differential?

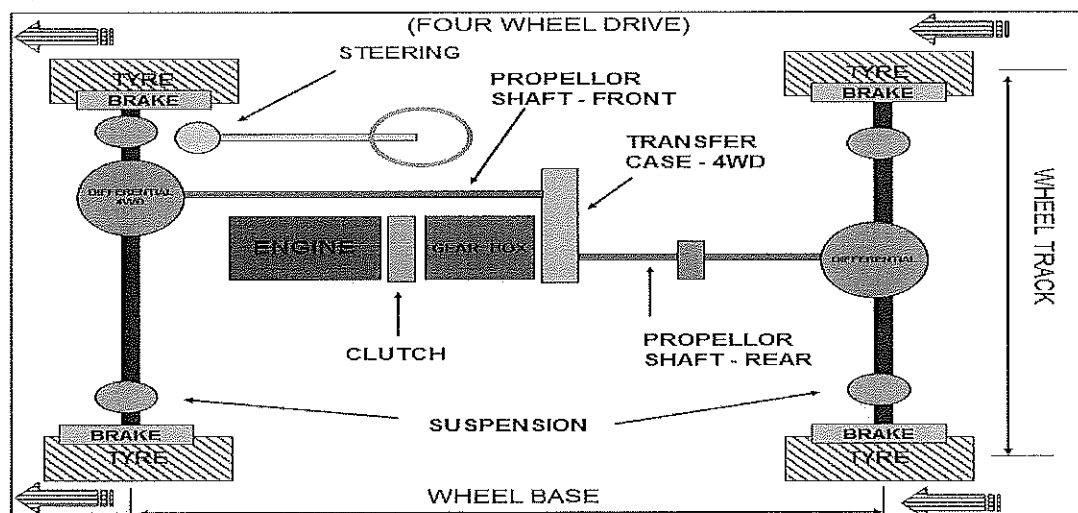
Ans: -

In case of automobiles, the differential has three functions: To transfer power from engine to wheels. To act as the final gear reduction in the vehicle after the gearbox. Allows wheels to **rotate** at different speeds.



12) Draw an anatomy of four-wheel drive of an automobile.

Ans: -



13) Write the classification of clutch.

Ans: -

A. Based on Actuation Mechanism

- Mechanical
 - Through Mechanical Linkages
 - Through Cable
- Hydraulic

B. Based on No. of Plates

- Single Plate Clutch
- Multi- Plate Clutch

C. Based on operation

- Manual
- Automatic
 - Centrifugal Clutch
 - Torque Converter
 - Fluid Coupling

14) What are the differences between single and multi-plate clutch?

Ans: -

S.No.	Single plate Clutch	Multi-plate Clutch
1.	As the name suggests, single plate clutch consists of a clutch plate whose both sides are coated with a frictional material.	The multi Plate clutch consists more than one clutch plate.
2.	Torque transmitting capacity is less.	High torque transmitting capacity
3.	Heat generation is less, so there is no need of a cooling medium. It is called "dry clutches."	Heat generation is more due to more frictional surface. So it needs a cooling medium and referred as "wet type" clutch.
4.	The coefficient of friction is high.	The coefficient of friction is low.
5.	Single plate clutch used where large radial space available. e.g. Trucks, Cars	Multiple Disc clutch is used where compact construction is desirable. E.g. Motorcycle, Scooter.

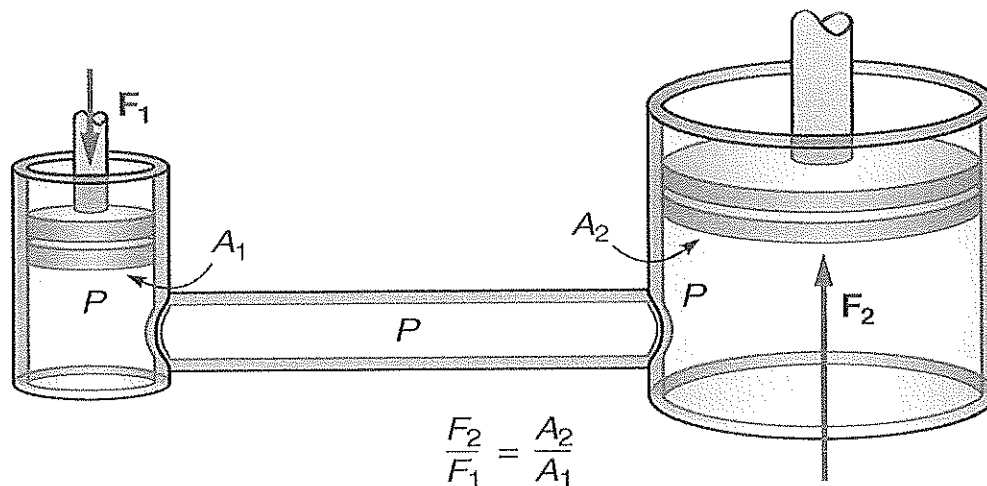
15) States Pascal's Law with the help of diagram.

Ans: -

Pascal's law basically states that any pressure applied to a fluid inside a closed system will transmit that pressure equally in all directions throughout the fluid. This law is the basic

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principle that causes hydraulic power in heavy construction machines to work.



16) Mention the characteristics of brake fluid.

Ans: -

Characteristic of Brake Fluid-

- Low Compressibility
- Constant boiling point
- Low freezing point
- Lubrication of moving parts
- Materials compatibility
- Anticorrosion protection
- Oxidative resistance and Thermal stability

17) Write the advantages and disadvantages of helical gear over spur gear.

Ans: -

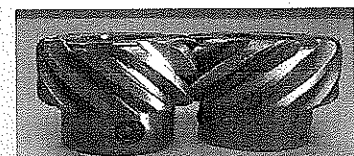
Helical Gears

Advantages:

1. Run more quietly and smoothly than spur gears.
2. More efficient
3. Can run at higher speeds
4. Has a higher load carrying capacity than spur gears of similar size.

Disadvantages:

1. Create thrust loads, thus need to be supported by proper bearings.
2. High cost



Gears on parallel shafts must be of opposite hands.

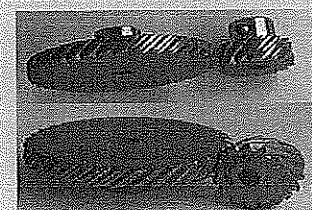


Image from Wikimedia Commons

18) What are the safety equipment used in mechanical shop? Write its name & advantages.

Ans: -

The safety equipment used in mechanical shop are as follows:

- Masks and Respirators.
- Eye Protection.
- **Gloves** and Hand Protection.
- Protective **Clothing**.
- Air plug
- Safety shoes
- Face shield

Advantages

The purpose of Personal Protective Equipment (PPE) is to protect employees from exposure to work place hazards and the risk of injury. Before using or assigning PPE, steps should always be taken to eliminate or control hazards and work procedures should be in place to limit exposure to these hazards.

Section – C

05X10 = 50 Marks

19) Discuss the general servicing procedures of a vehicle.

Ans: -

The general service includes:

- Engine oil change
- Oil filter change
- Replace the fuel filter
- Air filter change
- Check both rear and front brake
- Check the level of brake and clutch fluid
- Grease and lubricate components
- Check the proper operation of all the lights, wiper etc.
- Check the error code in ECU and take corrective action.
- Wash the vehicle and clean the interiors.

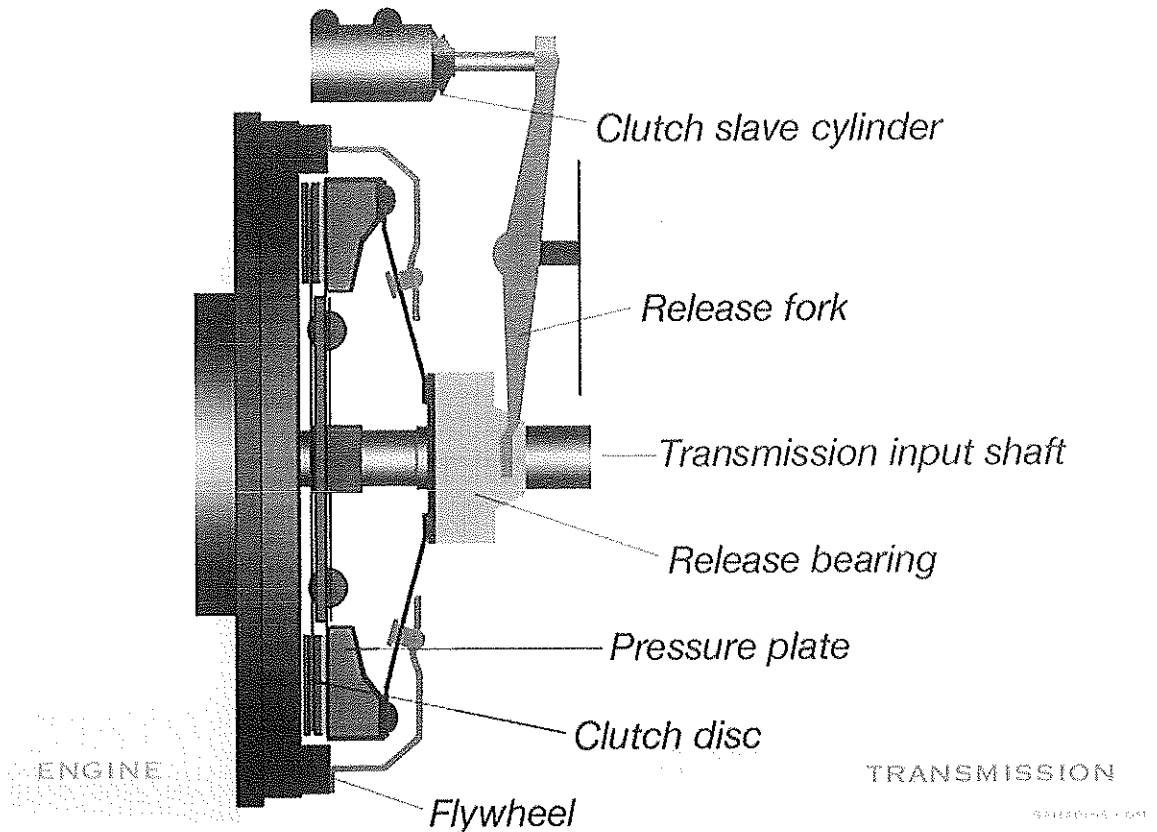
20) Explain the working principle of clutch with the help of labeled diagram.

Ans: -

WORKING PRINCIPLE OF CLUTCH

- It operates on the principle of friction
- What is Friction?
 - It is the resistance that one surface or object encounters when moving over another
- Clutch is a combination of two friction surfaces.

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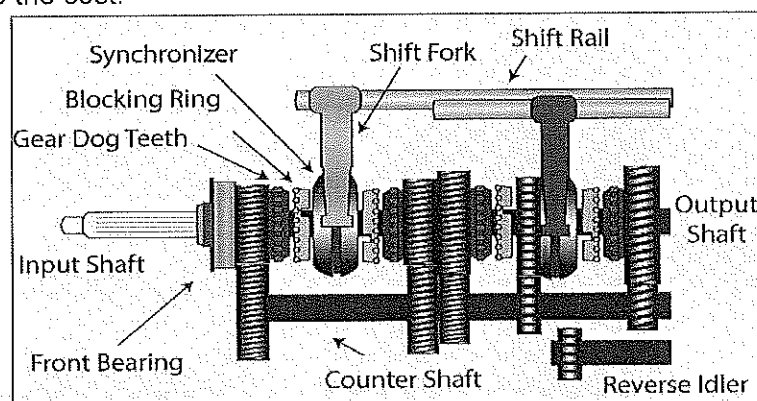
21) Discuss the modification in synchromesh gear box with the help of diagram.

Ans: -

❖ Synchromesh gear box:

This type of gearbox is similar to the constant mesh type in that all the gears on the main shaft are in constant mesh with the corresponding gears on the lay shaft. The gears on the lay shaft are fixed to it while those on the main shaft are free to rotate on the same.

Its working is also similar to the constant mesh type, but in the former there is one definite improvement over the latter. This is the provision of synchromesh device which avoids the necessity of double-declutching. The parts that ultimately are to be engaged are first brought into frictional contact, which equalizes their speed, after which these may be engaged smoothly. Figure shows the construction and working of a synchromesh gearbox. In most of the cars, however, the synchromesh devices are not fitted to all the gears as is shown in this figure. They are fitted only on the high gears and on the low and reverse gears ordinary dog clutches are only provided. This is done to reduce the cost.



22) Explain the working of Anti-Lock Braking System with their block diagram.

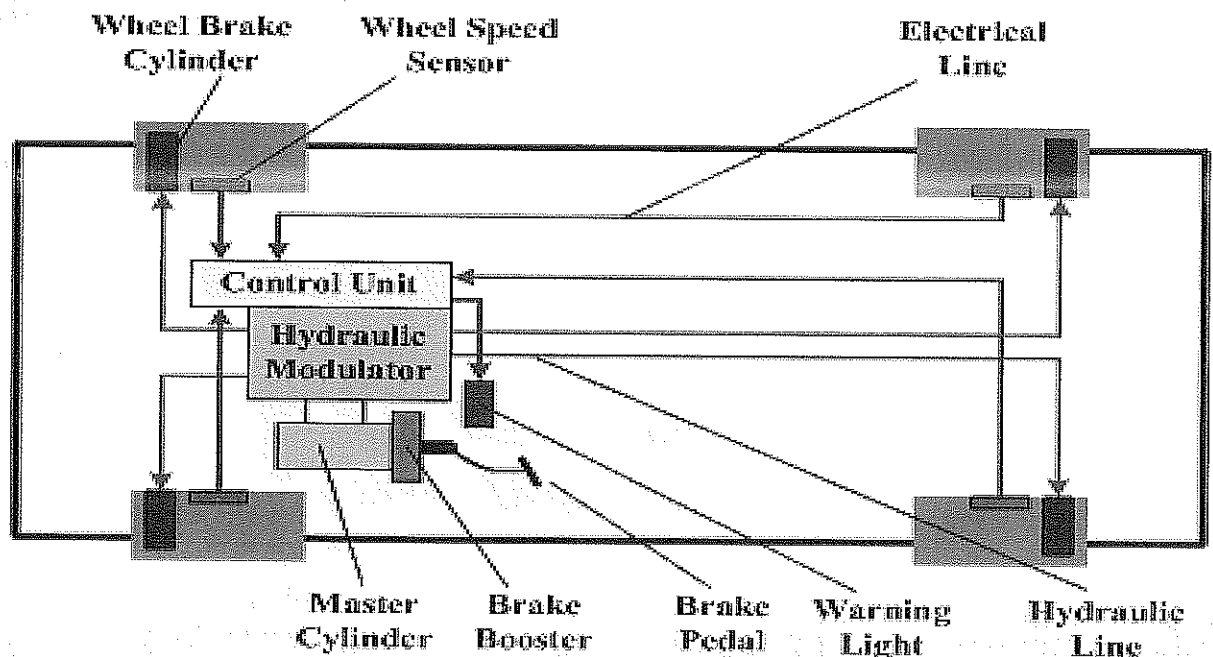
Ans: -

ANTILOCK BRAKING SYSTEM

- An anti-lock braking system or anti-skid braking system (ABS) is an automobile safety system that allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding.
- ABS generally offers improved vehicle control and decreases stopping distances on dry and slippery surfaces; however, on loose gravel or snow-covered surfaces, ABS can significantly increase braking distance, although still improving vehicle steering control.

Working

- The controller (ECU-Electronic Control Unit) reads the signal from each of the speed sensors of the wheel.
- As the brakes are suddenly applied by the driver, this makes the wheel to decelerate at faster rate and may cause the wheel to Lock.
- As the ECU reads the signal which indicates the rapid decrease in the speed of the wheel, it sends signal to the valve which makes the valve close and the pressure to the brake pad reduces and prevents the wheel from locking.
- The wheel again starts to accelerate, again the signal sends to the controller, this time it opens the valve, increasing the pressure to the brake pad and brakes are applied, this again reduces the speed of the wheel and tries to make it stop.
- This process of applying brakes and releasing it happens 15 times in a second when a driver suddenly applies the brake harder. Due to this the locking of the wheel is prevented and the skidding of the vehicle eliminated. During braking with ABS system, the driver can steer the vehicle and reduces the risk of vehicle collision.



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23) Describe the working of four stroke diesel engine.

Ans: -

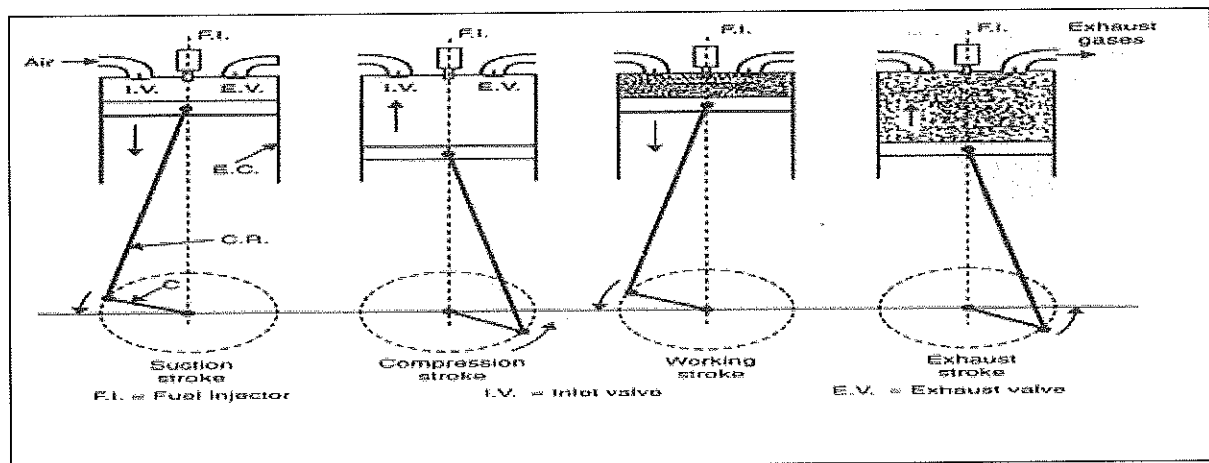
Four stroke engines have four strokes. It completes the cycle in four stroke of piston or two revolution of crankshaft. Diesel is used in four stroke petrol engine and injector is used. The brief information of four stroke diesel engine is as follows:

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.

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.

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.



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23) Describe the working of four stroke diesel engine.

Ans: -

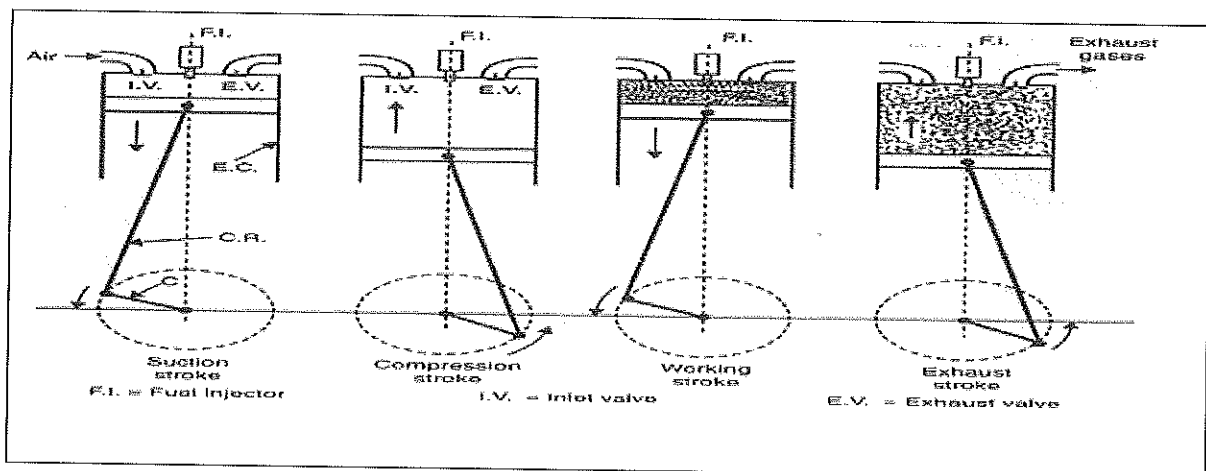
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School of Automotive Skills

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Course Code: OE1101

Time: 3 Hours

Course Name: BASICS OF AUTOMOBILES

Max. Marks: 100

Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Attempt any 06 questions out of 08 questions from section – B, each question carries five marks.
3. Answer all questions from section – C, each question carries ten marks.

Section – A

20X01 = 20 Marks

Q 1. What is the full form of TWI?

- | | |
|--------------------------|--------------------------|
| a. Tread wear indicator. | c. Tread worn indicator. |
| b. Tyre wear indicator. | d. Tyre worn indicator. |

Q 2. Which system of an automobile is essential to be checked by a doctor?

- | | |
|-----------------------------|-----------------------------|
| a. Air Conditioning System. | c. Antilock Braking System. |
| b. Steering System. | d. Air Bags (SRS). |

Q 3. In an automotive workshop the equipment used for raising the vehicle from ground level to a desired height is known as:

- | | |
|--------------------|-----------------------|
| a. Screw Jack. | c. Two – Post Lift. |
| b. Hydraulic Jack. | d. None of the above. |

Q 4. Which equipment is used to balance wheel of the vehicles?

- | | |
|---------------------|--------------------|
| a. Tyre changer. | c. Wheel balancer. |
| b. Wheel alignment. | d. Tyre inflator. |

Q 5. Function of tread in a tyre is:

- | | |
|-------------------------|--------------------------------|
| a. To give better look. | c. To give structural support. |
| b. To provide friction. | d. To improve strength. |

Q 6. Which material is used to make tyre bead wire?

- | | |
|-----------------|-------------------------|
| a. Rubber. | c. Aluminium. |
| b. Copper wire. | d. High-strength steel. |

Q 7. What are the angles considered during wheel alignment?

- | | |
|------------|----------------------|
| a. Castor. | c. Toe. |
| b. Camber. | d. All of the above. |

Q 8. The backbone of a vehicle is:

- | | |
|-------------|-----------|
| a. Engine. | c. Body. |
| b. Chassis. | d. Frame. |

Q 9. Otto cycle is based on which type of fuel system?

- a. Diesel.
- b. Kerosene.
- c. Petrol.
- d. Steam.

Q 10. The system used to change the direction of a vehicle:

- a. Steering system.
- b. Differential system.
- c. Suspension system.
- d. None of the above.

Q 11. The motion of the cam is transferred to the valves through:

- a. Piston.
- b. Rocker arm.
- c. Crankshaft.
- d. Camshaft.

Q 12. If the air-fuel mixture in the spark ignition engine is too rich, then air-fuel ratio is about:

- a. 17:1.
- b. 15:1.
- c. 13:1.
- d. 10:1.

Q 13. What is the full form of TDC?

- a. Top dead centering.
- b. Top death center.
- c. Top depth center.
- d. Top dead center.

Q 14. Which component is used in electrical steering system?

- a. Differential.
- b. Transmission.
- c. Suspension.
- d. Reduction gear.

Q 15. What is the best temperature to use summer tyre?

- a. Below +8°C.
- b. Above + 8°C.
- c. Above +7°C.
- d. Below +7°C.

Q 16. While grinding what is the safety we should put in the body repair shop?

- a. Safety goggles.
- b. Ear plugs.
- c. Safety shoes.
- d. All of the above.

Q 17. Tyre size is mostly represented as:

- a. 225/55/16.
- b. 225/65/R16.
- c. 225/55 R16.
- d. 225/60 R15.

Q 18. Types of tyre based on application is:

- a. Summer tyre.
- b. Run flat tyre.
- c. Winter tyre.
- d. All season tyre.

Q 19. What modifies and transfers the torque of an engine to a driveline in an automobile?

- a. Propeller shaft.
- b. Differential.
- c. Axles.
- d. Gear box.

Q 20. The distance between top most point of piston travel to the bottom most point of piston movement is known as:

- a. Stroke.
- b. Bore.
- c. CC.
- d. Clearance.

Section – B

06X05 = 30 Marks

- Q 21.** Define Automobile. What is the purpose of an automobile in our daily life?
- Q 22.** Write briefly about four stroke engine with a diagram.
- Q 23.** Explain the different types of painting process.
- Q 24.** Explain sheet metal used in body shop, and name the processes used during sheet metal preparation.
- Q 25.** Explain roles and responsibilities of a body care technician.
- Q 26.** Explain and classify the gear boxes (Transmissions).
- Q 27.** Explain body section and their types in detail.
- Q 28.** Explain roles and responsibilities of a body care technician.

Section – C

05X10 = 50 Marks

- Q 29.** Explain in detail the classification of chassis.
- Q 30.** Explain the following:
1. Wheel balancer.
 2. Tyre changer.
 3. Wheel aligner.
- Q 31.** Classify types of gears and explain them in detail.
- Q 32.** Explain the classification of engines on the basis of method of ignition, number of strokes, cycle of combustion, arrangement of cylinder and fuel used.
- Q 33.** What is the process of wheel bearing maintenance?

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Course Code: OE1101

Time: 3 Hours

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Max. Marks: 100

Section – A

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Q 1. What is the full form of TWI?

- a. Tread wear indicator.
- b. Tyre wear indicator.
- c. Tread worn indicator.
- d. Tyre worn indicator.

Answer: a. Tread wear indicator.

Q 2. Which system of an automobile is essential to be checked by a doctor?

- a. Air Conditioning System.
- b. Steering System.
- c. Antilock Braking System.
- d. Air Bags (SRS).

Answer: d. Air Bags (SRS).

Q 3. In an automotive workshop the equipment used for raising the vehicle from ground level to a desired height is known as:

- a. Screw Jack.
- b. Hydraulic Jack.
- c. Two – Post Lift.
- d. None of the above.

Answer: c. Two-post Lift.

Q 4. Which equipment is used to balance wheel of the vehicles?

- a. Tyre changer.
- b. Wheel alignment.
- c. Wheel balancer.
- d. Tyre inflator.

Answer: c. Wheel balancer.

Q 5. Function of tread in a tyre is:

- a. To give better look.
- b. To provide friction.
- c. To give structural support.
- d. To improve strength.

Answer: b. To provide friction.

Q 6. Which material is used to make tyre bead wire?

- a. Rubber.
- b. Copper wire.
- c. Aluminium.
- d. High-strength steel.

Answer: d. High-strength steel.

Q 7. What are the angles considered during wheel alignment?

- a. Castor.
- b. Camber.
- c. Toe.
- d. All of the above.

Answer: d. all of the above.

Q 8. The backbone of a vehicle is:

- a. Engine.
- b. Chassis.
- c. Body.
- d. Frame.

Answer: b. Chassis.

Q 9. Otto cycle is based on which type of fuel system?

- a. Diesel.
- b. Kerosene.
- c. Petrol.
- d. Steam.

Answer: c. Petrol.

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Q 10. The system used to change the direction of a vehicle:

- a. Steering system.
- b. Differential system.
- c. Suspension system.
- d. None of the above.

Answer: a. steering system.

Q 11. The motion of the cam is transferred to the valves through:

- a. Piston.
- b. Rocker arm.
- c. Crankshaft.
- d. Camshaft.

Answer: b. Rocker arm.

Q 12. If the air-fuel mixture in the spark ignition engine is too rich, then air-fuel ratio is about:

- a. 17:1.
- b. 15:1.
- c. 13:1.
- d. 10:1.

Answer: d. 10:1.

Q 13. What is the full form of TDC?

- a. Top dead centering.
- b. Top death center.
- c. Top depth center.
- d. Top dead center.

Answer: d. Top dead center.

Q 14. Which component is used in electrical steering system?

- a. Differential.
- b. Transmission.
- c. Suspension.
- d. Reduction gear.

Answer: d. reduction gear.

Q 15. What is the best temperature to use summer tyre?

- a. Below +8°C.
- b. Above + 8°C.
- c. Above +7°C.
- d. Below +7°C.

Answer: c. Above +7°C.

Q 16. While grinding what is the safety we should put in the body repair shop?

- a. Safety goggles.
- b. Ear plugs.
- c. Safety shoes.
- d. All of the above.

Answer: d. All of the above.

Q 17. Tyre size is mostly represented as:

- a. 225/55/16.
- b. 225/65/R16.
- c. 225/55 R16.
- d. 225/60 R15.

Answer: c. 225/55 R16.

Q 18. Types of tyre based on application is:

- a. Summer tyre.
- b. Run flat tyre.
- c. Winter tyre.
- d. All season tyre.

Answer: b. Run Flat Tyre.

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Q 19. What modifies and transfer the torque of an engine to a driveline in an automobile?

- a. Propeller shaft.
- b. Differential.
- c. Axles.
- d. Gear box.

Answer: d. Gearbox.

Q 20. The distance between top most point of piston travel to the bottom most point of piston movement is known as:

- a. Stroke.
- b. Bore.
- c. CC.
- d. Clearance.

Answer: a. stroke.

Section – B

06X05 = 30 Marks

Q 21. What are the safety equipment used in wheel care section?

Answer:

Safety glasses: 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.

Q 22. Write briefly about four stroke engine with diagram.

Answer:

A four-stroke (also four-cycle) engine is an internal combustion (IC) engine in which the piston completes four separate strokes while turning the crankshaft. A stroke refers to the full travel of the piston along the cylinder, in either direction. The four separate strokes are termed:

1. **Intake:** Also known as induction or suction. This stroke of the piston begins at top dead centre (T.D.C.) and ends at bottom dead centre (B.D.C.). In this stroke the intake valve must be in the open position while the piston pulls an air-fuel mixture into the cylinder by producing vacuum pressure into the cylinder through its downward motion. The piston is moving down as air is being sucked in by the downward motion against the piston.
2. **Compression:** This stroke begins at B.D.C, or just at the end of the suction stroke, and ends at T.D.C. In this stroke the piston compresses the air-fuel mixture in preparation for ignition during the power stroke (below). Both the intake and exhaust valves are closed during this stage.

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3. **Combustion:** Also known as power or ignition This is the start of the second revolution of the four stroke cycle. At this point the crankshaft has completed a full 360-degree revolution. While the piston is at T.D.C. (the end of the compression stroke) the compressed air-fuel mixture is ignited by a spark plug (in a gasoline engine) or by heat generated by high compression (diesel engines), forcefully returning the piston to B.D.C. This stroke produces mechanical work from the engine to turn the crankshaft.
4. **Exhaust:** Also known as outlet. During the exhaust stroke, the piston once again returns from B.D.C. to T.D.C. while the exhaust valve is open. This action expels the spent air-fuel mixture through the exhaust valve.

Q 23. Explain the main elements used in paint preparation.

Answer:

Paint is made up of five basic elements:

1. Binder/Resin.
 2. Pigment.
 3. Additives.
 4. Hardener.
 5. Solvent.
- Binder:
 1. It provides paint its gloss.
 2. It also provides hardness, durability and adhesion.
 3. It also wets the pigment from a powder to a liquid.
 - Pigment:
 1. These are small particles of powder that are insoluble in water or organic solvents.
 2. They are added to give the coating colour and good hiding power.
 3. The most commonly used pigments are yellow and red iron oxides.
 - Additives:
 1. It improves the paint film properties.
 2. It is also used to eliminate the flaws and defects which effects the finish of the car.
 3. There are different types of additives like flexible agents, fish-eye additives , drying additives , flattening additives etc.
 - Hardener:
 1. It is used to initiate and complete the drying process.
 2. It also speed up the drying process.
 - Solvent:
 1. It reduces the viscosity.
 2. It dissolves the binder and pigment to a liquid state.

Q 24. Explain sheet metal used in body shop, and name the processes used during sheet metal preparation.

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Answer:

Sheet metal is metal formed by an industrial process into thin, flat pieces. It is one of the fundamental forms used in metalworking and it can be cut and bent into a variety of shapes. Countless everyday objects are fabricated from sheet metal. Thicknesses can vary significantly; extremely thin sheets are considered foil or leaf, and pieces thicker than 6 mm (0.25 in) are considered plate.

Sheet metal is available in flat pieces or coiled strips. The coils are formed by running a continuous sheet of metal through a roll slitter.

There are many different metals that can be made into sheet metal, such as aluminium, brass, copper, steel, tin, nickel and titanium. For decorative uses, important sheet metals include silver, gold, and platinum (platinum sheet metal is also utilized as a catalyst.)

Sheet metal is used in automobile and truck (lorry) bodies, airplane fuselages and wings, medical tables, roofs for buildings (architecture) and many other applications.

- Shearing processes -- processes which apply shearing forces to cut, fracture, or separate the material.
- Forming processes -- processes which cause the metal to undergo desired shape changes without failure, excessive thinning, or cracking. This includes bending and stretching.
- Finishing processes -- processes which are used to improve the final surface characteristics.

Q 25. Explain roles and responsibilities of a body care technician.

Answer:

- An auto body repairer 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. Repair technicians use many tools for their work. To remove damaged parts, such as bumpers and door panels, they use pneumatic tools, metal-cutting guns, and plasma cutters. For major structural repairs, such as aligning the body, they often use heavy-duty hydraulic jacks and hammers. For some work, they use common hand tools, such as metal files, pliers, wrenches, hammers, and screwdrivers.
- In some cases, repair technicians do an entire job by themselves. In other cases, especially in large shops, they use an assembly line approach in which they work as a team with each repair technician specializing. Although repair technicians sometimes prime and paint repaired parts, automotive painters generally perform these tasks. Auto body and related repairers, or collision repair technicians, straighten metal panels, remove dents, and replace parts that cannot be fixed. Although they repair all types of vehicles, most work primarily on cars, sport utility vehicles, and small trucks.

Q 26. Explain and classify the gear boxes (Transmissions).

Answer:

- Gear box modifies & transmits the torque of the engine to the drive line.
- The amount of modification of torque required is decided by the driver and is actuated by a gear lever which selects a gear ratio.

Gear boxes are classified as:

1. Steeped Transmission

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2. Step-less Transmission (used only in 2 Wheelers)
 - Stepped Transmission are gear boxes which has defined steps or gear ratios. The number of steps can be 3,4 or 5.
 - Stepped transmissions can be further classified as:
 - Manual Transmission: Gear is selected by the driver as per driving requirement.
 - Automatic transmission: Gear ratio is automatically selected as decided by ECU based on information from various sensors.

Q 27. Explain body section and their types in detail.

Answer:

Car body section can be divided into major three sections:

- Front section
- Middle section
- Rear section

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

Q 28. Explain roles and responsibilities of a wheel care technician.

Answer:

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

Section – C

05X10 = 50 Marks

Q 29. Explain in detail the classification of chassis.

Answer:

Classification of Chassis:

Generally, chassis is classified into three types on the basis of frame used. They are:

- a) Ladder chassis
- b) Backbone chassis
- c) Monocoque chassis

Ladder chassis

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- It is one of the oldest forms of automotive chassis that is still used by most of the SUVs till today.
- Ladder chassis resembles a shape of a ladder having two longitudinal rails inter linked by several lateral and cross braces.

Backbone chassis

- This type of automotive chassis is strong and powerful enough to provide support smaller sports car.

Monocoque chassis

- Monocoque Chassis is a one-piece structure that prescribes the overall shape of a vehicle.
- This type of automotive chassis is manufactured by welding floor pan and other pieces together

Q 30. Explain the followings:

1. Wheel balancer.
2. Tyre changer.
3. Wheel aligner.

Answer:

1. **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.

2. **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.

3. **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.

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Q 31. Classify types of gears and explain them in detail.

Answer:

- A gear is a rotating wheel part having teeth, which mesh with another rotating toothed wheel to transmit torque.

Geared devices can change:

- Speed.
- torque.
- direction of a power source.

Gear can be classified as follows:

- Spurs.
- Helical.
- Bevel.
- Worm Gears.
- Rack and pinion.

Q 32. Explain the classification of engines on the basis of method of ignition, number of strokes, cycle of combustion, arrangement of cylinder, fuel used.

Answer:

CLASSIFICATION OF AUTOMOBILE

- Automobiles can be classified with different regards which are as under:

A). Purpose

B). Fuel used

C). Capacity

D). Construction

E). Suspension System

A). Purpose: According to purpose, it can be classified as

Passenger carriers – Car, Jeep, Bus etc...

Goods Carriers – Truck etc...

B). Fuel used: According to Fuel used, it can be classified as

Petrol vehicle: Motor cycles, Scooters, Cars, Station wagons.

Diesel Vehicle: Trucks, Buses etc...

Gas Vehicle: Coal gas Turbine...

Electric: Using storage batteries.

Steam: using Steam engine (obsolete).

C). Capacity: As per Capacity of Vehicles, It can also be classified as

HTV (Heavy transport Vehicles): Trucks, Buses, Dumpers etc...

LTV (Light transport Vehicles): pick up, Station Wagon

LMV (Light Motor vehicles): Jeeps, cars

Medium Vehicle: Station wagon, Tempo, Minibus and small trucks.

D). Suspension System: According to types of suspension used in vehicle

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Conventional: Leaf spring

Independent: Coil spring, Torsion bar, Pneumatic

Q 33. What is the process of wheel bearing maintenance?

Answer:

Step 1. Prepare the vehicle.

Step 2. Remove wheel and brake unit.

Step 3. Removing The Bearing Hub Assembly.

Remove the dust cap and remove the locking device. This is usually a cotter pin through the nut & spindle.

Step 4. Remove hub seal.

Using a long dowel pin or drift & using a hammer, gently drive on the front of the inner hub bearing from inside the hub unit.

Step 5. Clean and Check the Oil Bearing.

Use a paper towel to wipe all of the old bearing grease from the spindle and the hub dust cap.

Clean the bearing with solvent & air dry on a paper towel or blow it dry with compressed air.

Step 6. Inspect The Bearing.

Inspect the bearing and it's housing, which is called the "Bearing Race," for damage.

IF you see any pitting or damage, replace all the bearing set.

Step 7. Re-pack Grease into Bearing.

Check your shop manual to see which grease is recommended for the vehicle and its application. The most common method is to pack the bearings by hand.

Step 8. Grease Inside of the Hub and Dust Cap.

Put a small amount of grease in the cavity of the hub.

Also pack some grease into the dust cap. Fill it about one-third, not all the way up.

Step 9. Re-install The Bearing and Seal.

Re-install the bearing in the same bearing race. Leave a ring of grease below the bearing race to help keep the fresh grease inside the bearing area after it heats up.

Step 10. Inspect the Sealing Area of the Spindle.

Inspect the sealing area of any signs of wear or damage. If the seal area is worn or grooved.

Step 11. Re-install Bearing Hub Assembly.

Slide the hub assembly onto the spindle and ensure it sits on the sealing area.

Put the outer bearing in place.

April 24th 1901. The following is a list of the
names of the persons who have been
admitted to the membership of the
Society since the last meeting.

10



Registration No.:

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, End-Sem. Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT1102

Time: 3 Hours

Course Name: Automotive Wheel Care & Steering System

Max. Marks: 100

Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Attempt any 06 questions out of 08 questions from section – B, each question carries five marks.
3. Answer all questions from section – C, each question carries ten marks.

Section – A

20X01 = 20 Marks

Q 1. What is the full form of TWI?

- | | |
|--------------------------|--------------------------|
| a. Tread wear indicator. | c. Tread worn indicator. |
| b. Tyre wear indicator. | d. Tyre worn indicator. |

Q 2. The main function of steering pump is:

- | | |
|-------------------------|-----------------------|
| a. To provide force. | c. To provide torque. |
| b. To provide pressure. | d. To provide load. |

Q 3. During changing the tyre which type of liquid is applied on the tyres:

- | | |
|------------|---------------|
| a. Oil. | c. Kerosene. |
| b. Diesel. | d. Tyre lube. |

Q 4. What is the best temperature to use summer tyre?

- | | |
|-----------------|----------------|
| a. Below +8°C. | c. Above +7°C. |
| b. Above + 8°C. | d. Below +7°C. |

Q 5. Which type of plier is used to mount counter weight?

- | | |
|------------------------|----------------------|
| a. Pincers. | c. Lineman's pliers. |
| b. Needle nose pliers. | d. Weight plier. |

Q 6. Which mechanism is used for bead breaking in tyre changer machine?

- | | |
|----------------|-------------------|
| a. Electrical. | c. Pneumatic. |
| b. Mechanical. | d. None of these. |

Q 7. Material of the car wheel is:

- | | |
|-------------|------------------------|
| a. Plastic. | c. Pressed steel disk. |
| b. Wood. | d. Copper. |

Q 8. Function of tread in a tyre is:

- | | |
|-------------------------|--------------------------------|
| a. To give better look. | c. To give structural support. |
| b. To provide friction. | d. To improve strength. |

- Q 9.** How many types of assistive power steering system are used?
 a. 4. c. 1.
 b. 3. d. 2.
- Q 10.** How many kinds of counter weight are used for wheel balancing?
 a. 4. c. 2.
 b. 6. d. 3.
- Q 11.** How many universal joints are used in a steering system:
 a. 2. c. 1.
 b. 3. d. 4.
- Q 12.** Which material is used to make tyre bead wire?
 a. Rubber. c. Aluminium.
 b. Copper wire. d. High-strength steel.
- Q 13.** Which equipment is used to balance wheel of the vehicles?
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- Q 14.** Where is the bead located in the tyre?
 a. At surface. c. On side walls.
 b. On edges. d. Inner side.
- Q 15.** What are the angles considered during wheel alignment?
 a. Castor. c. Toe.
 b. Camber. d. All of the above.
- Q 16.** Which type of bearing is used in wheel assembly?
 a. Roller Bearing. c. Tapper Roller Bearing.
 b. Ball Bearing. d. Self-Aligning Bearing.
- Q 17.** What is the full form of TPMS?
 a. Tyre Pressure Monitoring Sensor. c. Tyre Pressure Master Cylinder.
 b. Tyre Pressure Maintenance Sensor. d. Tyre Puncture Management Sensor.
- Q 18.** What is the full form of OEM?
 a. Original Equipment Manager. c. Optional Equipment Manufacturer.
 b. Original Equipment Master. d. Original Equipment Manufacturer.
- Q 19.** Which material is used to make tyre bead wire?
 a. Rubber. c. Aluminium.
 b. Copper wire. d. High-strength steel.
- Q 20.** Function of grooves in tyre is to:
 a. Provide a better look. c. Give structural support.
 b. Provide air or water flow. d. None of these.

Section – B

06X05 = 30 Marks

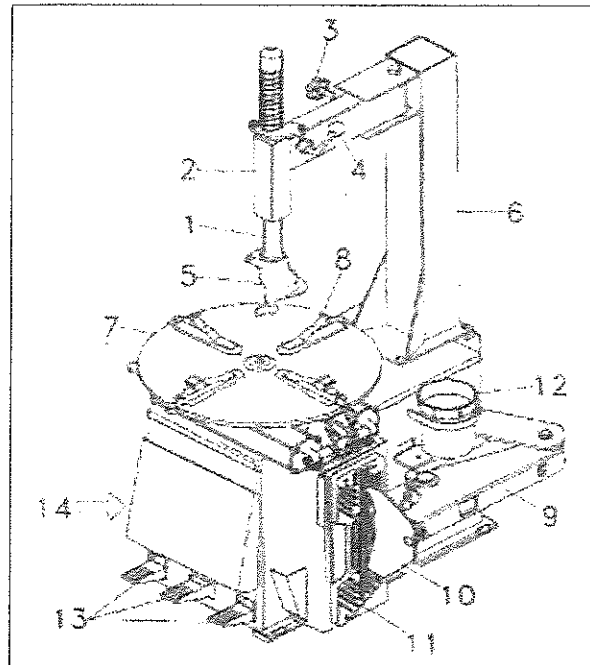
- Q 21.** What are the safety equipment used in wheel care section?
- Q 22.** Write the name of tyres based on their applications also explain run-flat tyre.
- Q 23.** What is the process of wheel bearing maintenance?
- Q 24.** Write briefly about the components of a steering system of an automobile.

Q 25. Explain Camber, Caster and Toe Angle with the help of diagrams.

Q 26. Differentiate between tools and equipment.

Q 27. Write briefly about requirement of a good steering system.

Q 28. Identify the components of tyre changer in the figure given below:



Section – C

05X10 = 50 Marks

Q 29. What is Wheel Balancing? Also write the advantages of wheel balancing.

Q 30. Explain the role & responsibilities of a wheel care technician in a automotive workshop.

Q 31. Explain the different types of season tyre along with the differences based on their applications.

Q 32. Explain the standard process of wheel alignment on an automobile also write its advantages.

Q 33. Write different types of screwdrivers and explain them.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills
1st Semester, End-Sem. Examination
B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT1102

Course Name: Automotive Wheel Care and Steering System

Time: 3 hours

Max. Marks: 100

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- c. Kerosene.
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- d. Below +7°C.

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- c. To give structural support.
- d. To improve strength.

Answer: b. To provide friction.

Q 9. How many types of assistive power steering system are used?

- a. 4.
- b. 3.
- c. 1.
- d. 2.

Answer: d. 2.

Q 10. How many kinds of counter weight are used for wheel balancing?

- a. 4.
- b. 6.
- c. 2.
- d. 3.

Answer: c. 2.

Q 11. How many universal joints are used in a steering system?

- a. 2.
- b. 3.
- c. 1.
- d. 4.

Answer: a. 2.

Q 12. Which material is used to make tyre bead wire?

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- c. Aluminium.
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Answer: d. High-strength steel.

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Answer: c. Wheel balancer.

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Q 14. Where is the bead located in the tyre?

- a. At Surface.
- b. On edges.
- c. On side walls.
- d. Inner side.

Answer: b. On edges.

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- b. Ball Bearing.
- c. Tapper Roller Bearing.
- d. Self-Aligning Bearing.

Answer: c. Tapper Roller Bearing.

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- a. Tyre Pressure Monitoring Sensor.
- b. Tyre Pressure Maintenance Sensor.
- c. Tyre Pressure Master Cylinder.
- d. Tyre Puncture Management Sensor.

Answer: a. Tyre Pressure Monitoring Sensor.

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- a. Original Equipment Manager.
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- c. Optional Equipment Manufacturer.
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- a. Provide a better look.
- b. Provide air or water flow.
- c. Give structural support.
- d. None of these.

Answer: b. Provide air or water flow.

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Section – B

06X05 = 30 Marks

Q 21. What are the safety equipment used in wheel care section?

Answer:

Safety glasses: 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.

Q 22. Write the name of tyres based on their applications also explain run-flat tyre.

Answer:

- Run-flat.
- Racing.
- Light trailer.
- Heavy duty truck.
- Off-the-road.
- Agricultural and off-road flotation tires.
- Industrial.
- Aircraft.
- Motorcycle.

Run-flat Tyres:

- Run flat tyres are designed in such a way to remain operational in the event of a puncture or a severe loss of air pressure allowing you to make it to safety, be that so you can return home or to your nearest tyre fitter.
- Run flat tyres also reduce the risk of tyre blow outs which could be dangerous and a risk to the safety of the driver and other road users if they occur at speed.

Working of run-flat tyres:

- Run flat tyres have much thicker, reinforced sidewalls which means they can be driven on for a short time after picking up a puncture. The tyre can temporarily maintain its shape and strength even in the event of a total loss of air pressure.

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- Run flat tyres have obvious safety benefits as the tyre is still able to be driven on in the event of a puncture allowing you, the driver, to stay in control of the vehicle. This isn't to say run flat tyres do not need air and in the unfortunate event of a puncture you should seek help as soon as possible. It is advised that you should travel no more than 50 miles on a punctured run flat tyre.

Q 23. What is the process of wheel bearing maintenance?

Answer:

Step 1. Prepare the vehicle.

Step 2. Remove wheel and brake unit.

Step 3. Removing The Bearing Hub Assembly.

Remove the dust cap and remove the locking device. This is usually a cotter pin through the nut & spindle.

Step 4. Remove hub seal.

Using a long dowel pin or drift & using a hammer, gently drive on the front of the inner hub bearing from inside the hub unit.

Step 5. Clean and Check the Oil Bearing.

Use a paper towel to wipe all of the old bearing grease from the spindle and the hub dust cap.

Clean the bearing with solvent & air dry on a paper towel or blow it dry with compressed air.

Step 6. Inspect The Bearing.

Inspect the bearing and it's housing, which is called the "Bearing Race," for damage.

IF you see any pitting or damage, replace all the bearing set.

Step 7. Re-pack Grease into Bearing.

Check your shop manual to see which grease is recommended for the vehicle and its application. The most common method is to pack the bearings by hand.

Step 8. Grease Inside of the Hub and Dust Cap.

Put a small amount of grease in the cavity of the hub.

Also pack some grease into the dust cap. Fill it about one-third, not all the way up.

Step 9. Re-install The Bearing and Seal.

Re-install the bearing in the same bearing race. Leave a ring of grease below the bearing race to help keep the fresh grease inside the bearing area after it heats up.

Step 10. Inspect the Sealing Area of the Spindle.

Inspect the sealing area of any signs of wear or damage. If the seal area is worn or grooved.

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Step 11. Re-install Bearing Hub Assembly.

Slide the hub assembly onto the spindle and ensure it sits on the sealing area.

Put the outer bearing in place.

Q 24. Write briefly about the components of a steering system of an automobile.

Answer:

- Steering Wheel
- Steering Column & Shaft
- Universal Joint
- Steering Gear Box
- Steering Pump
- Linkage (Tie Rod)
- Rubber Bush

Steering Wheel

- Steering wheels are used in most modern vehicles like buses, light and heavy trucks, and tractors.

Steering Column & Shaft

- The automotive steering column is a device intended primarily for connecting the steering wheel to the steering mechanism or transferring the driver's input torque from the steering wheel.

Universal Joint

- In most cars with an intermediate steering shaft, there are two u-joint couplings.
- The top u-joint connects the intermediate shaft to the steering column.
- The lower u-joint connects the intermediate shaft to the steering rack.

Steering Gear Box

- The steering gearbox contains the gears that transmit the driver's steering inputs to the steering linkage that turns the wheels, and it multiplies the driver's steering changes so that the front wheels move more than the steering wheel.

Steering Pump

- The hydraulic power for the steering is provided by a rotary-vane pump

Oil reservoir

- The oil reservoir sends the oil to the power steering pump and receives the oil from the power steering gear.

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Steering linkage

- Steering linkage is the part of an automotive steering system that connects to the front wheels.

Q 25. Explain Camber, Caster and Toe Angle with the help of diagrams.

Answer:

Caster:

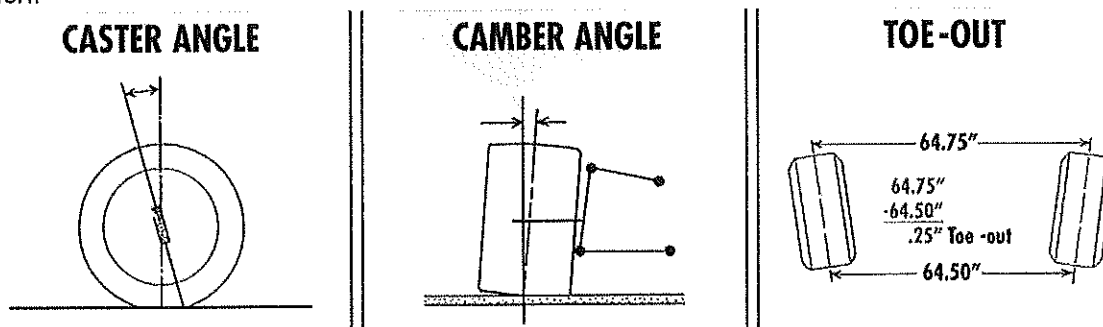
- This angle shows the forward or backward slope of a line drawn through the upper and lower steering pivot points, when viewed directly from the side of the vehicle.
- Also expressed in degrees, caster is measured by "comparing a line running through the steering system's upper and lower pivot points to a line drawn perpendicular to the ground,"

Camber:

- This suspension angle shows how the tire angles away from 0 degrees vertical when viewed from either the front or rear of the vehicle. Expressed in degrees, negative camber means the top of the tire tilts toward the centre of the vehicle, while positive camber means the top of the tire tilts away from centre.
- A visual cue for a camber problem is excessive tire wear on the inner or outermost ribs.

Toe:

- Identifies the direction tires are pointed relative to the centreline of the vehicle, when viewed from directly above. Toe can be expressed in either degrees or fractions of an inch.



Q 26. Differentiate between tools and equipment.

Answer:

Sr. No.	Tools	Equipment
1	A tool can be any item that is used to achieve a goal	Equipment usually denotes a set of tools that are used to achieve a specific objective

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2	A tool can be non-mechanical device	A equipment is a mechanical device
3	The usage of tools among human beings runs back to millions of years	The use of equipment is more of a recent development.
4	Tools are often seen to be used by animals	Equipment is only used by human beings.
5	Example: wrenches and wrench set, pliers, nut drivers, screwdrivers, etc.	Example: wheel balancer, tyre changer, wheel aligner, etc.

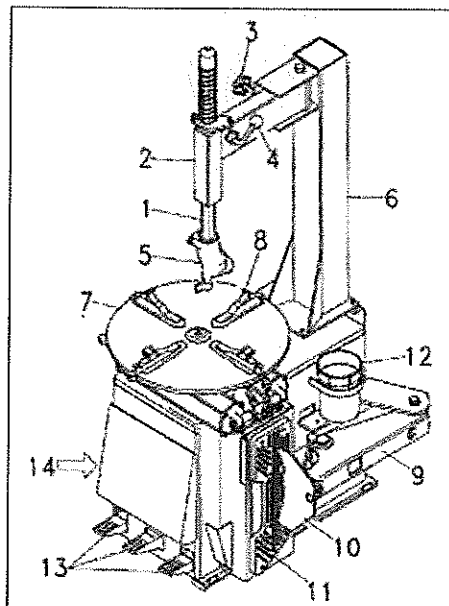
Q 27. Write briefly about requirement of good steering system.

Answer:

Following are the requirements of a good steering system:

- Very accurate.
- Easy to handle.
- Provide directional stability.
- Multiply the turning effort applied on the steering wheel by the driver.
- Irreversible to a certain degree, so that the shocks of the road surface encountered by the wheels are not transmitted to driver's hands.

Q 28. Identify the components of tyre changer in the figure given below:



Answer:

- Vertical slide.
- Swing arm.
- Adjustable knob.

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4. Lock lever.
5. Mount / demount head.
6. Tower or column.
7. Turntable.
8. Jaw or clamp.
9. Bead breaker arm.
10. Bead breaker blade.
11. Bead breaker pads.
12. Lube pail.
13. Foot pedal controls.
14. Bead seater/ inflator pedal.

Section – C

05X10 = 50 Marks

Q 29. What is Wheel Balancing? Also write the advantages of wheel balancing.

Answer:

Step 1: Put safety first.

Before you can begin to do anything, make sure you are protected by wearing some safety equipment. Make sure you are wearing steel toes boots, long pants, safety glasses or goggles, and gloves.

Step 2: Ensure you have proper tires.

Make sure the tyres that you have on the rims are good for the road. No cracks on the sidewall, and to have at least (50%) of tread depth.

Step 3: Make sure you have no centre caps and wheel weights.

Before mounting the wheel onto the machine, make sure you have your centre caps off (if you have them), and the old wheel weights from the previous balancing off. This is to ensure that you get the most accurate results from the machine.

Step 4: Mount the wheel.

After you have done all the previous steps, you can now safely mount your wheel onto the machine. Once it is on, double check to make sure that the wheel is snug tight

Step 5: Measure the wheel.

Once the wheel is on, the machine will want to know the size of the rim. You will have to measure the height of the rim, as well as the width

Step 6: Select your vehicle.

Depending on the machine you're using, it may have a feature which allows you to choose what type of vehicle this wheel will be going on so it can put the proper amount of road force when it's being tested.

Step 7: Enter proper tire pressure accordingly to your vehicle specifications.

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If you don't do this before closing down the hood, it will ask you if you have done it or not to be a reminder.

Step 8: Start.

Once you have measure your rims and have chosen the proper type of vehicle, you can simply presses start or close the hood.

Step 9: Install wheel weights.

Once the machine has finished testing the road force and balance the wheel, it will tell you how much weight it wants and what side of the wheel.

Step 10: Rebalance.

Once you have install the wheel weights, you want to rebalance the wheel to make sure you added the proper amount of the wheel weights, and at the proper spot of the rim it has asked.

Step 11: Finish up.

This means now your wheel is balanced.

Q 30. Explain the role & responsibilities of a wheel care technician in an automotive workshop.

Answer:

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

Q 31. Explain the different types of season tyre along with the differences based on their application.

Answer:

Summer Tyres:

- Summer tyres are designed to work best during the warmer summer months.
- They are created with a specific tread pattern for optimal performance on both dry and wet roads when the air temperature is above +7°C.

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Advantages	Disadvantage
Better mileage	Stopping distances is high
Reduced fuel consumption	Less safe compare to winter tyre
Improved driver comfort	
Reduced noise	

Winter Tyres:

- Winter tyres look very similar to summer tyres but are specially developed to provide additional driving performance in winter conditions. It is a common misconception that winter tyres are only for driving in the snow.
- Winter tyres are designed to work best in conditions below +7°C, so even in wet and icy conditions, you'll benefit from their superior grip and handling.

Advantages
• Shorter stopping distances
• Safety and improved performance
• Grip in snow, and wet conditions

All Season Tyres:

All season tyres essentially combine elements of summer tyres and winter tyres.

- To create a tyre that has benefits of both so that they can be used all-year round, giving drivers peace of mind whatever the weather throws at them.

Advantage
Avoid the cost changing between summer and winter tyres.
Not required to Purchasing two sets of tyres.
Finish storing multiple sets of tyres

- While all season car tyres are not likely to match the performance of specialist summer or winter tyres during these respective seasons, they provide a good all-round mix of strengths.

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Q 32. Explain the standard process of wheel alignment on an automobile also write its advantages.

Answer:

Wheel Alignment Process:

- Step 1: Depending on your alignment equipment, enter the vehicle year, make, model and design into the system's computer to determine the OEM (Original equipment manufacturer) alignment specifications.
- Step 2: Next, drive the vehicle onto your alignment rack.
- Step 3: Next, check and adjust tire pressures to OEM Remove hubcaps if present.
- Step 4: Mount targets to wheel ends as required by the rack manufacturer.
- Step 5: Depending on your alignment equipment and system, there are unique procedures that will measure the current camber, caster and toe angles of the vehicle and report that information either on a print-out or on a diagnostic screen.
- Step 6: If the rear alignment needs to be adjusted, this has to be performed before working on front-end adjustments.
- Step 7: With front-end alignments, correct caster and camber adjustments first.
- Step 8: With caster and camber adjusted, then adjust toe angles.
- Step 9: Restart the car, remove the steering wheel lock, turn the steering wheel back and forth a couple times, then re-centre and replace the steering wheel lock. Recheck alignment specifications, and then readjust angles as necessary.
- Step 10: Remove the alignment heads and lower the vehicle.
- Step 11: Complete the alignment by taking a test drive to ensure any previously noted symptoms are gone or can be attributed to other vehicle issues.

Advantages:

- Reduce tyre wear.
- Reduce steering effort.
- Save tyre cost.
- Reduce steering maintenance cost, etc.

Q 33. Write different types of screwdrivers and explain them.

Answer:

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 era where screws were handmade will have a slot head screw. Most people call this a flat head screw or flat head screwdriver.
2. Phillips – Most people don't realize that a Phillips head screwdriver is designed 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 like 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.



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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.



Registration No:.....

SCHOOL OF AUTOMOTIVE SKILLS
1ST SEMESTER END-SEMESTER EXAMINATION – 2018
SUMMER SEMESTER, B. VOC. PROGRAM

Course Code: AUT1103

Time: 3 Hour

Course Name: AUTOMOTIVE BODY REPAIR

Max. Marks: 100

Instructions: (1) Attempt all question from section A & section C.

(2) Attempt any six questions from section B.

Section-A

Select the one correct option from the given options in the following questions : - (10x2) = 20 Marks

Q.1 (I) In arc welding, the three elements to controlled to obtain satisfactory welding operation are...

- | | |
|--|----------------------------------|
| a) Current, voltage & speed of travel | c) Current, voltage & arc length |
| b) Current, arc length & speed of travel | d) None of the above |

(II) the voltage needed in resistance welding does not depend upon:

- | | |
|----------------------|-------------------|
| a) Composition | c) Area |
| b) Thickness of weld | d) Length of weld |

Q.2 (I) Select Destructive type testing methods:

- | | |
|----------------------|----------------------------|
| a) Visual Inspection | c) Tensile Testing |
| b) X-ray Testing | d) Dye Penetration testing |

(II) Wire feeding system is used to.....

- | | |
|-----------------------------|-----------------------|
| a) Control the gas pressure | c) Adjust the voltage |
| b) Control the wire speed | d) Both a) & b) |

Q.3 (I) Which of the following joints have high corrosion resistance?

- | | |
|------------------|----------------------|
| a) Welding joint | c) Bolted joint |
| b) Riveted joint | d) None of the above |

(II) Which of the following types is not fillet weld?

- | | |
|---------------|-----------------|
| a) Butt joint | c) lap joint |
| b) T-joint | d) Corner joint |

Q.4 (I) Which of the following welding process use non-consumables electrode?

- | | |
|-----------------------------|-------------------------------|
| a) Gas tungsten arc welding | c) Shielded metal arc welding |
| b) Co2 shielded welding | d) Gas metal arc welding |

(II) The gap between the electrode rod and the work piece should be about

- a) the electrode diameter
- b) the work piece thickness
- c) 5 mm
- d) the core wire diameter

Q.5 (I) For gas tungsten arc welding..... electrode is used.

- a) Consumable
- b) Non-consumable
- c) filler
- d) None of the above

(II) The deposition rate of TIG welding is very high.

- a) True
- b) False
- c) Both (a) & (b)
- d) None of the above

Q.6 (I).....is a machine that changes the shape of a work piece by the application of pressure.

- a) Dent puller
- b) Grinder
- c) Press machine
- d) Lathe machine

(II) Which of the following isn't forming process?

- a) Slitting
- b) Stretching
- c) Bending
- d) All of the above

Q.7 (I) In resistance welding two electrodes are made of...

- a) Aluminum
- b) Iron
- c) Copper
- d) Bronze

(II) Plasma Cutting operates at a temperature of°C

- a) 1000°C- 1500°C
- b) 10000°C- 20000°C
- c) 1600°C- 2500°C
- d) More than 250000°C

Q.8 (I) Which of following gas mixtures is not used in TIG welding?

- a) Argon-helium
- b) Argon-hydrogen
- c) Argon-nitrogen
- d) Argon- carbon dioxide

(II) is an example of active gas.

- a) Helium
- b) Argon
- c) Neon
- d) Hydrogen

Q.9 (I) Extremely thin sheets are considered as

- a) Foil
- b) Steel
- c) plate
- d) None of the above

(II) Punching a number of holes in a sheet is known as.....

- | | |
|-------------|----------------|
| a) Blanking | c) Perforating |
| b) Slitting | d) Drawing |

Q.10 (I) A shallow deformation in the surface of an object, produce by an impact is known as.....

- | | |
|------------|---------------------|
| a) Scratch | c) Hole |
| b) Dent | d) All of the above |

(II) The dent which can be removed without any damage of vehicles paints are known as.....

- | | |
|-----------------|-----------------|
| a) Ding | c) Scratch |
| b) Extreme Dent | d) Creased Dent |

Section-B

(6x5=30) Marks

Q.11 What is the requirement of Body Shop in an automotive workshop?

Q.12 What is meant by brazing and soldering? Also mention the differences between brazing and soldering.

Q.13 Write brief about the protective equipment used in welding along with their functions.

Q.14 What are the characteristics of electrode coating?

Q.15 List the different types of weld joints along with their diagrams.

Q.16 Write about the different types of automotive body style with examples.

Q.17 Write short notes on:

- | | |
|-------------------|----------------------|
| a) Ladder Chassis | b) Monocoque Chassis |
|-------------------|----------------------|

Q.18 What are the advantages and disadvantages of manual metal arc welding?

Section-C

(5x10=50) Marks

Q.19 Explain the weld seam inspection procedures in details.

Q.20 Discuss the working principle of Manual Metal Arc Welding with the help of a diagram. Also write the classification of electrodes.

Q.21 Explain the Gas Shielded Arc Welding and also mention its applications.

Q.22 Describe the process of TIG welding with the help of a diagram. Write its advantages and disadvantages.

Q.23 Explain the different sheet metal processes.

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Registration No:.....

SCHOOL OF AUTOMOTIVE SKILLS
1ST SEMESTER END-SEMESTER EXAMINATION – 2018-2019
SUMMER SEMESTER, B. VOC. PROGRAM

Course Code: AUT1103

Time: 3 Hour

Course Name: AUTOMOTIVE BODY REPAIR

Max. Marks: 100

Instructions: (1) Attempt all question from section A & section C.

(2) Attempt any six questions from section B.

Section-A

Select the one correct option from the given options in the following questions :- (10x2) = 20 Marks

- 1) (I) In arc welding, the three elements to controlled to obtain satisfactory welding operation are...
- | | |
|--|----------------------------------|
| a) Current, voltage & speed of travel | c) Current, voltage & arc length |
| b) Current, arc length & speed of travel | d) None of the above |

Ans: - a)

- (II) the voltage needed in resistance welding does nit depend upon
- | | |
|----------------------|-------------------|
| a) Composition | c) Area |
| b) Thickness of weld | d) Length of weld |

Ans: - d)

- 2) (I) Select Destructive type testing methods:
- | | |
|----------------------|----------------------------|
| a) Visual Inspection | c) Tensile Testing |
| b) X-ray Testing | d) Dye Penetration testing |

Ans: - c)

- (II) Wire feeding system is used to.....

- | | |
|-----------------------------|-----------------------|
| a) Control the gas pressure | c) Adjust the voltage |
| b) Control the wire speed | d) Both a) & b) |

Ans: - b)

- 3) (I) Which of the following joint have high corrosion resistance?

- | | |
|------------------|----------------------|
| a) Welding joint | c) Bolted joint |
| b) Riveted joint | d) None of the above |

Ans: - a)

- (II) Which of the following types is not fillet weld?

- | | |
|---------------|-----------------|
| a) Butt joint | c) lap joint |
| b) T-joint | d) Corner joint |

Ans: - a)

- 4) (I) Which of the following welding process use non-consumables electrode?
- | | |
|-----------------------------|-------------------------------|
| a) Gas tungsten arc welding | c) Shielded metal arc welding |
| b) Co2 shielded welding | d) Gas metal arc welding |

Ans: - a)

- (II) The gap between the electrode rod and the work piece should be about
- | | |
|-----------------------------|---------------------------|
| a) the electrode diameter | c) 5 mm |
| b) the work piece thickness | d) the core wire diameter |

Ans: - d)

- 5) (I) For gas tungsten arc welding..... electrode is used.
- | | |
|-------------------|----------------------|
| a) Consumable | c) filler |
| b) Non-consumable | d) None of the above |

Ans: - a)

- (II) The deposition rate of TIG welding is very high.
- | | |
|----------|----------------------|
| a) True | c) Both (a) & (b) |
| b) False | d) None of the above |

Ans: - b)

- 6) (I).....is a machine that changes the shape of a work piece by the application of pressure.
- | | |
|----------------|------------------|
| a) Dent puller | c) Press machine |
| b) Grinder | d) Lathe machine |

Ans: - c)

- (II) Which of the following isn't forming process?
- | | |
|---------------|---------------------|
| a) Slitting | c) Bending |
| b) Stretching | d) All of the above |

Ans: - a)

- 7) (I) In resistance welding two electrodes are made of...
- | | |
|-------------|-----------|
| a) Aluminum | c) Copper |
| b) Iron | d) Bronze |

Ans: - c)

- (II) Plasma Cutting operates at a temperature of°C
- | | |
|---------------------|-----------------------|
| a) 1000°C- 1500°C | c) 1600°C- 2500°C |
| b) 10000°C- 20000°C | d) More than 250000°C |

Ans: - b)

- 8) (I) Which of following gas mixtures is not used in TIG welding?
- | | |
|-------------------|--------------------------|
| a) Argon-helium | c) Argon-nitrogen |
| b) Argon-hydrogen | d) Argon- carbon dioxide |

Ans: - c)

- (II) is an example of active gas.
- | | |
|-----------|-------------|
| a) Helium | c) Neon |
| b) Argon | d) Hydrogen |

Ans: - d)

- 9) (I) Extremely thin sheets are considered as
- | | |
|----------|----------------------|
| a) Foil | c) plate |
| b) Steel | d) None of the above |

Ans: - a)

(II) Punching a numbers of holes in a sheet is known as.....

- a) Blanking
- b) Slitting

- c) Perforating
- d) Drawing

Ans: - c)

10) (I) A shallow deformation in the surface of an object, produce by an impact is known as.....

- a) Scratch
- b) Dent

- c) Hole
- d) All of the above

Ans: - b)

(II) The dent which can be removed without any damage of vehicles paints are known as.....

- a) Ding
- b) Extreme Dent

- c) Scratch
- d) Creased Dent

Ans: - a)

Section-B

(6x5=30) Marks

11) What is the requirement of Body Shop in an automotive workshop?

Ans:

Automotive repair shops that specialize in bodywork repair are known as body shops. They offer paintwork repairs to scratches, scuffs and dents, as well as repairs to the bodies of vehicles damaged by traffic collisions.

12) What is meant by brazing and soldering? Also mention the difference between brazing and soldering.

Ans:

Soldering

The joining of metals using a filler material of a lower melting point than that of the parent metals to be joined. Soldering is normally done by melting the solder with a soldering iron and applying it to the two metals that are going to be joined together.

Brazing

Brazing is when a filler metal or alloy is heated to its melting temperature above 450 °C. In this case only filler metal melts; there is no melting of work piece metal.

Soldering		brazing
1	It is used in electrical industries to joint capacitor, resistor, wire etc. to the electronic plate.	It is used in mechanical industries to joint different metals.
2	soldering is done temperature below 200°C	Brazing is done at temperature above 450°C but below the critical temperature of metal.
3	These joint are weaker than brazing joints.	It forms stronger joints.
4	In soldering an alloy of lead and tin is used known as solder.	In brazing an alloy of copper and zinc is used as a filler metal.
5	It is a cheaper process.	It is a costly process.
6	Soldering does not need to preheat the base metal	This process need preheating of base metal.
7	It is used to join electronic components.	It is used in automotive industries and pipe fitting.

8	This process is very flexible and easy to automate.	It is not easy for automation except automation is done at automotive industries.
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13) Write brief about the protective equipment used in welding along with their functions.

Ans:

The protective equipment used in welding are:

- | | |
|-------------------|-------------------|
| i. King shield | v. Ear plug |
| ii. Gloves | vi. Apron |
| iii. Nose Mask | vii. Safety shoes |
| iv. Safety goggle | |

14) What are the characteristics of electrode coating?

Ans:

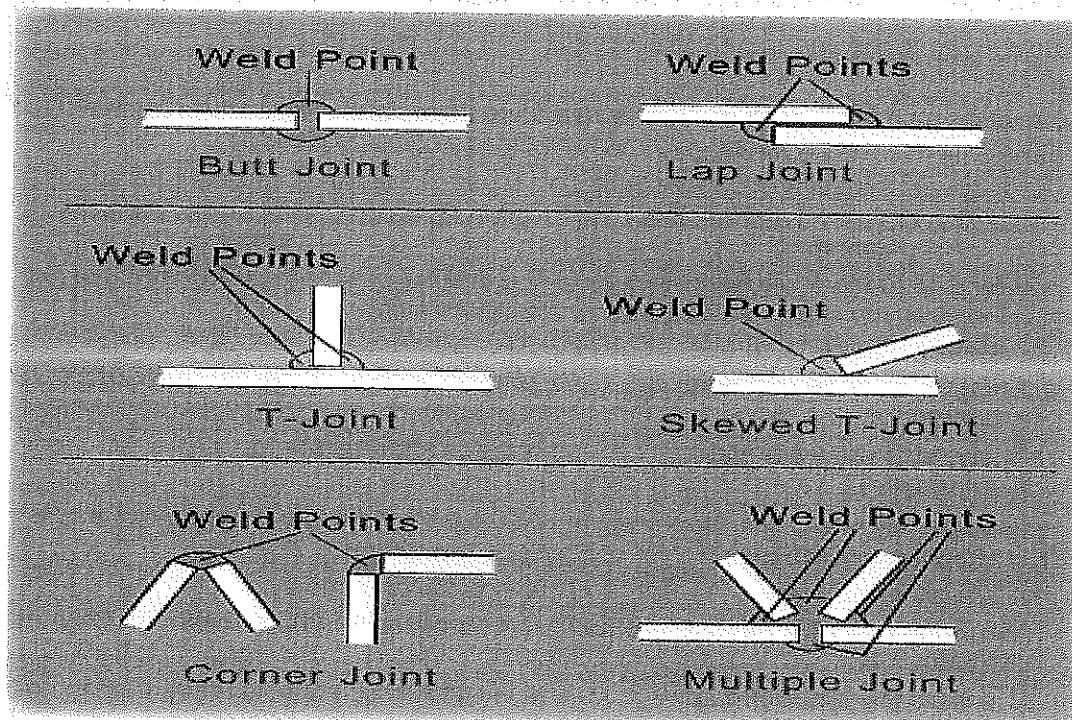
The characteristics of electrode coating are:

- Provide a protective atmosphere (a gas shield around the arc).
- Stabilize the arc.
- Act as a flux to remove impurities from the molten metal.
- Provide a protective slag coating to accumulate impurities, prevent oxidation, and slow the cooling of the weld metal.
- Reduce weld-metal spatter and increase the efficiency of deposition.
- Add alloying elements.
- Affect arc penetration (the depth of melting in the work piece).
- Influence the shape of the weld bead.
- Add additional filler metal.

15) List the different types of weld joints along with their diagrams.

Ans:

The different types of weld joints are:



16) Write about the different types of automotive body style with examples.

Ans:

Buying a car can be a tiring process, especially if it's for the first time. Each person has extremely specific needs. There are several factors to consider – price, family size, fuel type, mileage. If it is a second hand purchase, one may even look at age of the car, number of owners and mileage.

Different Types of Car Body Styles are:

Hatchback

Sedan/saloon

MUV/SUV

Coupe

Convertible/Cabriolet

Wagon

Van

Jeep

Pick up vehicle

Estate

17) Write short notes on:

a) Ladder Chassis

b) Monocoque Chassis

Ans:

Ladder chassis

It is one of the oldest forms of automotive chassis that is still used by most of the SUVs till today. Ladder chassis resembles a shape of a ladder having two longitudinal rails inter linked by several lateral and cross braces.

Monocoque chassis

Monocoque Chassis is a one-piece structure that prescribes the overall shape of a vehicle. This type of automotive chassis is manufactured by welding floor pan and other pieces together

18) What are the advantages and disadvantages of manual metal arc welding?

Ans:

Advantages

- i. Simple welding equipment

- ii. Portable- easy to transport
- iii. Works on dirty metal
- iv. Inexpensive power source
- v. Relatively inexpensive equipment
- vi. Welders use standard domestic current.
- vii. Big range of metals and alloys can be welded.
- viii. Used for maintenance, repair, and field construction

Disadvantages

- i. Not clean enough for reactive metals such as aluminium and titanium.
- ii. The deposition rate is limited because the electrode covering.
- iii. Relatively high metal wastage (electrode stubs)
- iv. The electrode length is ~ 35 mm and requires electrode changing lower the overall production rate.

Section-C

(5x10=50) Marks

19) Explain the weld seam inspection procedures in details.

Ans:

Welding Inspection Process

- Destructive Testing
- Non- Destructive Testing

Destructive testing includes;

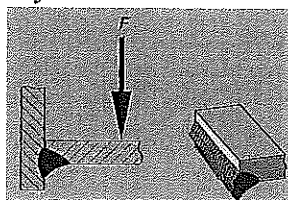
- i. Breaking test
- ii. Tension test
- iii. Bend test

Non- Destructive Testing include;

- i. Visual inspection
- ii. Ultrasonic testing
- iii. X-rays testing
- iv. Liquid penetration

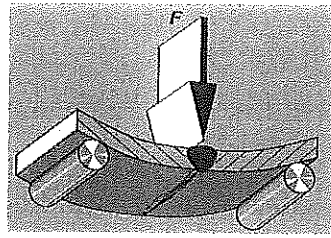
1. Fracture Test

The weld seam is mechanically broken.



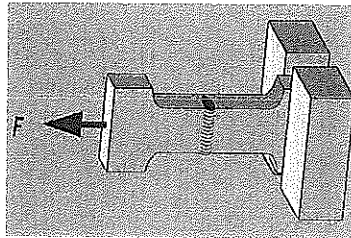
2. Bend Test

The welded seam is bend under a press until it breaks.



3. Tensile Test

During the tension test, flat or round stock is stretched until it breaks.



Non- Destructive Testing

1. Visual Examination

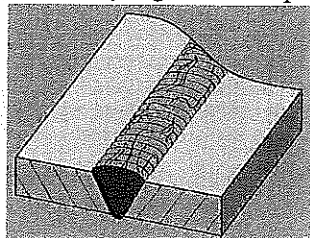
Use the naked eye and magnifying lens.

2. Liquid penetration

During the liquid penetration, special red liquid is sprayed on the seam.

The liquid penetrate through the capillary action, even into very thin cracks and gaps.

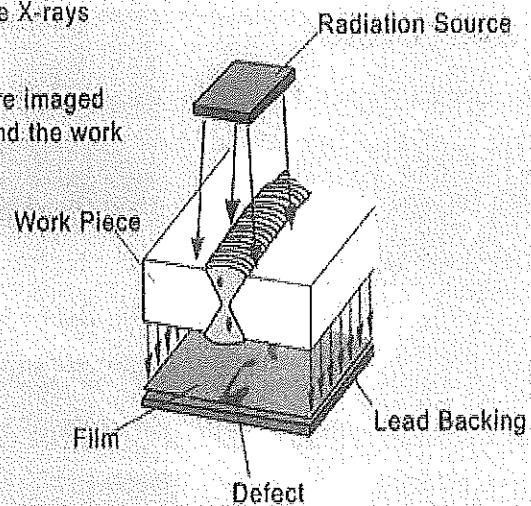
After drying, a white powder is applied which make visible to red visible



3. X-ray Inspection

During an X-ray inspection, the X-rays penetrate the weld seam.

Possible weld seam defects are imaged on a sheet of film placed behind the work piece.



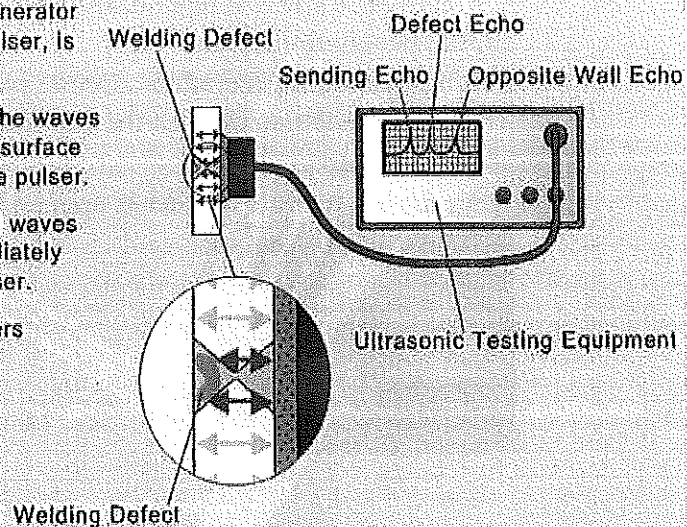
4. Ultrasonic Testing

During ultrasonic testing, a signal generator with an oil coupling, a so-called pulser, is placed on the site of the weld.

The pulser projects sound waves. The waves reflect off the opposite work piece surface and are then collected again by the pulser.

If there is a weld defect, the sound waves that strike the defect reflect immediately and return more quickly to the pulser.

The testing equipment then registers a defect echo.



20) Discuss the working principle of Manual Metal Arc Welding with the help of diagram. Also write the classification of electrodes.

Ans:

Manual metal Arc Welding

- During this welding procedure, the work piece material is melted by the high temperature of an electric arc.
- The arc is struck between an electrode and the work piece.

- During welding, welding power source, the electrode, the arc and the work piece form an electric circuit.
- This melts the electrode, which then serves as a filler metal for the weld seam.
- The temperature required of approx. 4000° C is achieved by the flow of an electric current of up to 1000 A.
- It is not possible to draw such powerful currents directly from the normal mains supply of 110 or 480 V.
- Such a procedure would also be extremely dangerous.
- Therefore, the line voltage is stepped down via special machines (welding power sources) to levels between 15 and 50 V, which makes possible higher current flows.
- Both direct current (DC) and alternating current (AC) can be used for welding.

21) Explain the Gas Shielded Arc Welding and also mention its applications.

Ans:

Gas shielded arc welding

- Gas shielded arc welding is also performed with the help of a welding arc.
- During welding, the molten pool is protected by a gaseous shield.
- The shield is not produced by the electrode covering.
- Here, the shielding gas comes directly from a gas cylinder and is fed through a gas nozzle on the torch to the welding point.
- Can be used from a wall thickness of approx. 0.6 mm
- High melting deposition rate
- Targeted heat input
- No or very little slagging
- Very little warping
- (virtually) continuous welding without changing the electrode

MIG welding

- Metal inert gas welding takes its name from the use of inert gases such as argon, helium and mixture of the two gases.
- MIG welding is an arc welding process in which a continuous solid wire electrode is fed through a welding gun and into the weld pool, joining two base materials together
- The process is semi-automatic because the electrode and gas are automatically fed through a welding gun at a user defined speed when the operator pulls down the trigger.

MAG welding

- Metal active gas welding takes its name from the active welding gas used (CO₂ or gas mixture (argon containing active gas, two or three components)).
- Long and short arc are used during MAG welding.
- MAG welding is a steel welding process.

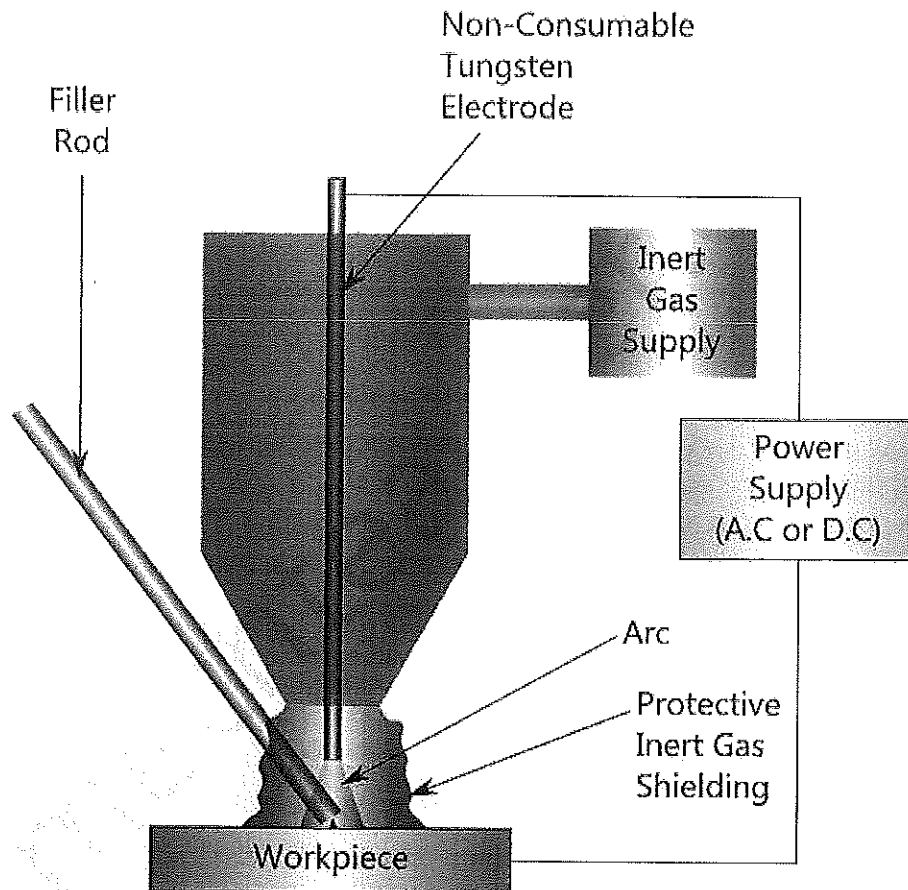
Application

It is used in mass production in industries, automotive body repair shops, etc.

22) Describe the process of TIG welding with the help of diagram. Write its advantages and disadvantages.

Ans:

Tungsten Inert Gas Welding (TIG Welding), also known as Gas Tungsten Arc Welding (GTAW), is an arc welding method that uses a non-consumable tungsten electrode to weld two or more work pieces. It is very much similar to Metal Inert Gas (MIG) Welding.



Advantages of Tungsten Inert Gas Welding (TIG Welding):

Tungsten Inert Gas Welding produces high quality welds.

The weld is automatically protected by the inert gas during the welding process.

No slag is produced.

TIG Welding can be done in any position.

Disadvantages of Tungsten Inert Gas Welding:

Tungsten inert gas welding is a slow process.

Highly skilled labor is needed.

Welder is exposed to huge intensities of light.

TIG welding is more expensive when compared to MIG welding.

23) Describe the different sheet metal processes.

Ans:

Sheet metal processing

Typically, sheets of metal are sold as flat, rectangular sheets of standard size. If the sheets are thin and very long, they may be in the form of rolls. Therefore the first step in any sheet metal process is to cut the correct shape and sized 'blank' from larger sheet.

Sheet metal forming processes

Sheet metal processes can be broken down into two major classifications and one minor classification

- **Shearing processes** -- processes which apply shearing forces to cut, fracture, or separate the material.
- **Forming processes** -- processes which cause the metal to undergo desired shape changes without failure, excessive thinning, or cracking. This includes bending and stretching.
- **Finishing processes** -- processes which are used to improve the final surface characteristics.

Shearing Process

- **Punching:** shearing process using a die and punch where the **interior** portion of the sheared sheet is to be **discarded**.
- **Blanking:** shearing process using a die and punch where the **exterior** portion of the shearing operation is to be **discarded**.
- **Perforating:** punching a number of holes in a sheet
- **Parting:** shearing the sheet into two or more pieces
- **Notching:** removing pieces from the edges
- **Lancing:** leaving a tab without removing any material

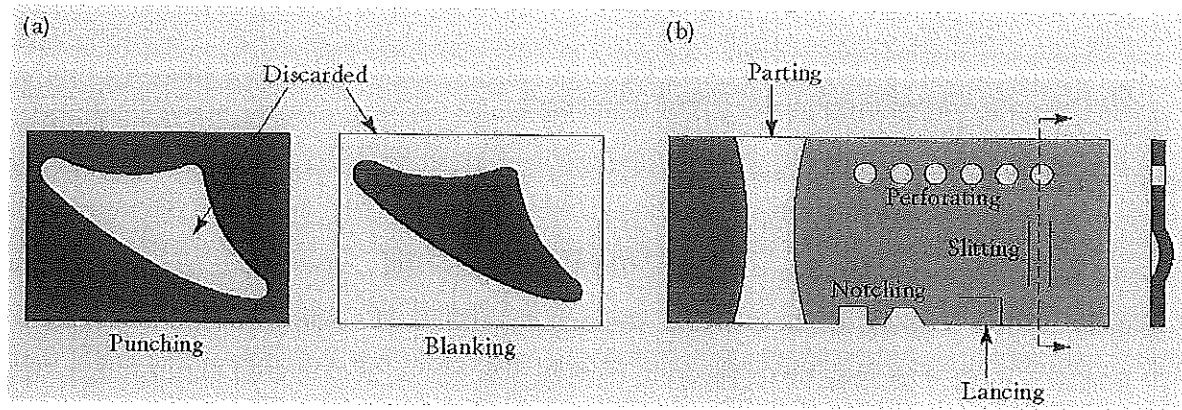


Fig.1 Shearing Operations: Punching, Blanking and Perforating

Forming Processes

- **Bending:** forming process causes the sheet metal to undergo the desired shape change by bending without failure.
- **Stretching:** forming process causes the sheet metal to undergo the desired shape change by stretching without failure.
- **Drawing:** forming process causes the sheet metal to undergo the desired shape change by drawing without failure.
- **Roll forming:** Roll forming is a process by which a metal strip is progressively bent as it passes through a series of forming rolls.



Registration No:

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, End-Sem Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT 1104

Time:3 Hour

Course Name: Automotive Painting Technology

Max. Marks: 100

Instructions: (1) Attempt all question from section A & section C.

(2) Attempt any six questions from section B

Section-A

Select the one correct option from the given options in the following questions :- 10x2=20 Marks

Q-1 (i) What should be the distance between HVLP spray gun and panel during painting?

- | | |
|---------------|------------------|
| a. 6-8 inches | c. 12-15 inches |
| b. 1-3 inches | d. None of these |

(ii) The Angle of spray gun during painting should be...

- | | |
|---------|------------------|
| a. 90° | c. 45° |
| b. 120° | d. None of these |

Q-2 (i). Which grit size is the most coarse among the following grit sizes?

- | | |
|---------|---------|
| a. P180 | c. P80 |
| b. P600 | d. P320 |

(ii). The equipment used to remove the extra putty from the surface is...

- | | |
|-------------------------|--------------|
| a. Putty Spreader Sheet | c. Spray gun |
| b. Dry Sander | d. Plier |

Q-3 (i). The air pressure of the HVLP spray gun should be....

- | | |
|------------|------------------|
| a. 2-3 bar | c. 5-6 bar |
| b. 4-5 bar | d. None of these |

(ii). The ventilation of the paint mixing room must be...

- | | |
|--------------|-----------------|
| a. Downwards | c. Sideways |
| b. Upwards | d. None of thes |

Q-4(i). The paint mixing room should be equipped with.....

- | | |
|------------------|----------------------|
| a. Blue lights | c. Artificial lights |
| b. Yellow lights | d. None of these |

(ii). Infrared dryer works on the principle of...

- a. Conduction
- b. Convection
- c. Radiation
- d. None of these

Q-5(i). Which automotive painting is also known as 3-stage painting...

- a. Solid painting
- b. Pearlscent painting
- c. Metallic painting
- d. None of these

(ii). The shape of the spray should be.....in shape.

- a. Circular
- b. Oval
- c. Triangular
- d. None of these

Q-6 (i). The clear coat is used for....

- a. Protection of paint
- b. Gloss of paint
- c. Both (a) and (b)
- d. None of these

(ii). The paint defect occurred due to wrong sanding is...

- a. Sanding scratches
- b. Orange peel
- c. Water spotting
- d. None of these

Q-7 (i). The size of nozzle tip for primer application is.....

- a. 1.8 mm
- b. 0.8 mm
- c. 1.3 mm
- d. None of these

(ii). The size of nozzle tip for clear coat application is...

- a. 1.8 mm
- b. 0.8 mm
- c. 1.2 mm
- d. None of these

Q-8 (i) The liquid used to make the paint smooth for spraying is ...

- a. Thinner
- b. Hardener
- c. water
- d. None of these

(ii). Which element of paint provides the paint its colour?

- a. Binder
- b. Pigment
- c. Solvent
- d. None of these

Q-9 (i) primer is used to....

- a. Protect the metal from rust
- b. Hide the putty
- c. Support the topcoat
- d. None of these

(ii) Which sanding promotes the corrosion?

- | | |
|----------------|---------------------|
| a. Wet sanding | c. Both (a) and (b) |
| b. Dry sanding | d. None of these |

Q-10 (i). The elements which enhance the properties of paint are....

- | | |
|--------------|------------------|
| a. Additives | c. Solvents |
| b. Binders | d. None of these |

(ii). DFT (Dry film thickness) is an instrument which is used to measure...

- | | |
|-------------------------|-------------------|
| a. Thickness of coating | c. Gloss of paint |
| b. Colour quantity | d. None of these |

Section-B

6x5=30 Marks

Q-11 What is paint? What are the different elements of paints?

Q-12. Write about different properties of primer.

Q-13. Write about jobs and responsibilities of a paint shop technician.

Q-14 Write about five consumables used in paint shop.

Q-15 Write about any five equipment used in paint shop.

Q-16 What is Infrared drying? What are the advantages of infrared drying?

Q-17 Write the steps for painting using solid paint.

Q-18 Why do we use dry guide coat during dry sanding?

Section-C

5x10=50 Marks

Q-19. What is paint defect? Write about different types of paint defects and explain any four with its causes, preventions and remedies.

Q-20. What is a spray gun? Explain different types of spray guns with their applications.

Q-21. What is primer? Explain different types of primers.

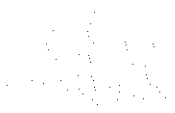
Q-22. What is masking? Explain different materials used for masking.

Q-23. Discuss about paint booth and paint mixing room.

Registration No:

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Question Paper

School of Automotive Skills

1st Semester, End-Sem Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT 1104

Time: 3 Hour

Course Name: Automotive Painting Technology

Max. Marks: 100

Instructions: Attempt all questions.

Section-A

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

20x1=20 Marks

Q-1 (i) What should be the distance between HVLP spray gun and panel during painting?

- a. 6-8 inches
- b. 1-3 inches
- c. 12-15 inches
- d. None of these

Answer- a

(ii) The Angle of spray gun during painting should be...

- a. 90°
- b. 120°
- c. 45°
- d. None of these

Answer- a

Q-2 (i). Which grit size is the coarsest among the following grit sizes?

- a. P180
- b. P600
- c. P80
- d. P320

Answer- c

(ii). The equipment used to remove the extra putty from the surface is...

- a. Putty Spreader Sheet
- b. Dry Sander
- c. Spray gun
- d. Plier

Answer- b

Q-3 (i). The air pressure of the HVLP spray gun should be....

- a. 2-3 bar
- b. 4-5 bar
- c. 5-6 bar
- d. None of these

Answer- a

(ii). The ventilation of the paint mixing room must be...

- a. Downwards
- b. Upwards
- c. Sideways
- d. None of these

Answer- a

Q-4(i). The paint mixing room should be equipped with....

- a. Blue lights
- b. Yellow lights
- c. Artificial lights
- d. None of these

Answer- c

(ii). Infrared dryer works on the principle of...

- a. Conduction
- b. Convection
- c. Radiation
- d. None of these

Answer- c

Q-5(i). Which automotive painting is also known as 3-stage painting...

- a. Solid painting
- b. Pearlscent painting
- c. Metallic painting
- d. None of these

Answer- b

(ii). The shape of the spray should be.....in shape.

- a. Circular
- b. Oval
- c. Triangular
- d. None of these

Answer- b

Q-6 (i). The clear coat is used for....

- a. Protection of paint
- b. Gloss of paint
- c. Both (a) and (b)
- d. None of these

Answer- c

(ii). The paint defect occurred due to wrong sanding is...

- a. Sanding scratches
- b. Orange peel
- c. Water spotting
- d. None of these

Answer- a

Q-7 (i). The size of nozzle tip for primer application is.... ..

- a. 1.8 mm
- b. 0.8 mm
- c. 1.3 mm
- d. None of these

Answer- a

(ii). The size of nozzle tip for clear coat application is...

- a. 1.8 mm
- b. 0.8 mm
- c. 1.2 mm
- d. None of these

Answer- c

Q-8 (i) The liquid used to make the paint smooth for spraying is ...

- a. Thinner
- b. Hardener
- c. water
- d. None of these

Answer- a

(ii). Which element of paint provides the paint its colour?

- a. Binder
- b. Pigment
- c. Solvent
- d. None of these

Answer- b

Q-9 (i) primer is used to....

- a. Protect the metal from rust
- b. Hide the putty
- c. Support the topcoat
- d. None of these

Answer- a

(ii) Which sanding promotes the corrosion?

- a. Wet sanding
- b. Dry sanding
- c. Both (a) and (b)
- d. None of these

Answer- a

Q-10 (i). The elements which enhance the properties of paint are....

- a. Additives
- b. Binders
- c. Solvents
- d. None of these

Answer- a

(ii). DFT (Dry film thickness) is an instrument which is used to measure...

- a. Thickness of coating
- b. Colour quantity
- c. Gloss of paint
- d. None of these

Answer- a

Section-B

Instructions: Attempt any six questions

6x5=30 Marks

Q-11 What is paint? What are the different elements of paints?

Ans. Paint is a mixture of different chemicals which gives aesthetic appearance, provides strength, prevent from atmospheric conditions.

Paint is made up of five basic elements: -

1. Binder/Resin
2. Pigment
3. Additives
4. Hardener
5. Solvent

• **Binder:-**

1. It provides paint its gloss.
2. It also provides hardness, durability and adhesion.
3. It also wets the pigment from a powder to a liquid.

• **Pigment:-**

1. These are small particles of powder that are insoluble in water or organic solvents.
2. They are added to give the coating color and good hiding power.
3. The most commonly used pigments are yellow and red iron oxides.

- **Additives:** -

1. It improves the paint film properties.
2. It is also used to eliminate the flaws and defects which effects the finish of the car.
3. There are different types of additives like flexible agents, fish-eye additives, drying additives, flattening additives etc.

- **Hardener:-**

1. It is used to initiate and complete the drying process.
2. It also speed up the drying process

- **Solvent:** -

1. It reduces the viscosity.
2. It dissolves the binder and pigment to a liquid state.
3. There are different types of additives like flexible agents, fish-eye additives, drying additives, flattening additives etc.

Q-12. Write about different properties of primer.

Ans **Adhesion** – they provide a strong bond between the sheet metal or old paint and the new paint

- **Rust resistance** – they resist the formation of rust where they adhere to the sheet metal
- **Build**– they're able to fill sanding and grinding marks in old paint, sheet metal and fillers
- **Sanding ease** – they can be sanded smooth and levelled quickly and easily
- **Hold out** – they prevent the paint from soaking in, which results in a dull finish
- **Drying speed** – a good high-build primer should be ready to sand in as little as 30 minutes

Q-13. Write about jobs and responsibilities of a paint shop technician.

Ans: The various jobs and responsibilities of paint shop technicians are: __

a. 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

- a. To identify and utilise the correct methods of working by using your experience, skills, training and industry knowledge,
- b. To keep your skills up-to-date by making appropriate efforts to acquire adequate knowledge of new vehicles.
- a. To identify and report all apparent faults considered to be advisable in the interest of safety and reliability

Q-14 Write about five consumables used in paint shop?

Ans List of consumables used in paint shop: -

1. Sanding discs
2. Putty
3. Dry guide coat
4. Primer
5. Tack cloths

Q-15 Write about any five equipment's used in paint shop.

Ans. The five equipment used in paint shop are: -

1. Dual Action sander
2. Paint Booth
3. Infrared dryer
4. Single action sander
5. Paint mixing rack

Q-16 What is Infrared drying? What are the advantages of infrared drying?

Ans **Infrared drying:** -

- It involves a heat transfer by radiation between a hot element and a material at lower temperature.
- The heat energy is directly transferred from the infrared source without the need of an intermediate such as air or water.

Advantages: -

- No direct contact with the product to be heated.
- High drying rate.
- Infrared radiation can be focused where it is needed

Q-17 Write the steps for painting using solid paint?

Ans steps for solid painting: -

- a. Inspection of defected area
 - b. Clean with prepsol degreaser (3919S)
 - c. Clean with soap and water (Dry)
- Application process: Wipe on and Wipe off Method.
- D. Sanding: P-80, P180, P320(Feather Edging)
 - E. Putty Application: (759/769 R Polyester putty: 762R Hardener = 100: 1-3% by weight.
 - E. Apply Guide coat
 - F. Putty dry sanding (P80, P180, P320) (120, 220, 320)
 - G. Blow air/ degreaser with 3920S
- Process: wipe on wipe off.
- H. Primer Surface application: (7701S/4004 fast process)
 - I. Apply dry guide coat.
 - J. Dry sanding with P320/ 400
 - K. Clean with air & degreaser 3920S.
 - L. Top Coat application.

Q-18 Why we use dry guide coat during dry sanding?

Ans. Dry guide coat is a black powder which is used to find the imperfection during putty and primer dry sanding. It guides the sander during the sanding that from which part we have to remove the material.

Section-C

5x10=50 Marks

Q-19. What is paint defect? Write about different paint defects and explain any four with its causes, preventions and remedies.

Ans: - **Paint defect**- Any dissimilarity between the original paint and refinish paint work is considered to be a paint defect.

There are lot of paint defects like: -

- 1.runs
- 2.water spotting
- 3.clouding
- 4.bird droppings
- 5.solvent popping

Brief description of defects: -

1.Runs

Causes: -

- Incorrect spraying viscosity, spraying technique.
- Defective spray gun set up.
- Incorrect spraying pressure.
- Temperature of paint, substrate or spray booth too low.
- Incorrect choice of hardeners and thinners

Prevention: -

- Ensure that the spray gun is in good working order.
- Warm object and material up to room temperature of 20 °C/68 °F.
- Use correct combination of hardeners and thinners.
-

Remedies: -

- Sand and polish.
- Sand and repaint

2. water spotting

Causes: -

- Topcoat not sufficiently cured.
- Excessive film thickness, drying time too short.

- Use of unsuitable thinner.
- Incorrect hardener mixing ratio.
- Wrong hardener used

Prevention: -

- Follow application recommendations on technical data sheets

Remedies: -

- After through-drying, remove marks by polishing
- Thoroughly dry topcoat, sand and repaint

3. Clouding

Causes: -

- Incorrect spraying viscosity, spraying technique, flash-off times, spray booth temperature.
- Defective spray gun set up, incorrect spraying pressure.
- Use of unsuitable thinner.

Prevention: -

- Adjust material correctly.
- Keep spray gun parallel to object.
- Choose suitable spray gun set up.
- Use manufacturer's thinners.

Remedies: -

- When using conventional base coat: use droplet method before spraying clear.
- After clear has through-dried, sand surface and repaint.

4. sanding scratches

Causes: -

- Sanding paper too coarse.
- Filler sanded when soft.
- Insufficient sanded polyester stopper.
- Insufficient isolation of the stopper before topcoat application

Prevention: -

- Use recommended grade sanding paper.
- Isolate repaired areas with 2K filler.
- Dry filler thoroughly.

Remedies: -

- Thoroughly dry and sand.
- Isolate or remove substrate, repaint

Q-20. What is a spray gun? Explain different types of spray guns with their applications.

Ans. The spray gun is the most popular type of spray application equipment used

- An spray gun is a tool which uses compressed air to atomise paint and to apply it to a surface.
- Air and material enter the gun through separate passages and are mixed at the air cap in a controlled pattern.

Different types of spray guns are: -

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 is through the gun ad 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 six to eight inches.

Q-21. What is primer? Explain different types of primers.

Ans

- Primers are the most common undercoats used when refinishing car bodies.
- Primer is a bonding agent which enables a bond between the surface underneath it and the paint that will be sprayed on top.

Basically primers are categorised in 2 parts:-

1. 1-k primers

2. 2-k primers

Types of primers:-

1. Epoxy primer:-

- Epoxy Primer is one of the most versatile primers available as its compatible with most any other coating.
- It's acceptable for use over bare metal.
- Surfaces coated with epoxy primer can also have plastic body filler applied over it if properly prepared.
- Sanding the metal with 80-120 grit sandpaper before epoxy Primer.

2. Self-Etching Primer:-

- This primer is most commonly a lacquer based primer that uses acid to etch bare, clean metal.
- It leaves a good base for urethane primers and top coats and is ideal for small spot repairs.
- When applied over properly prepared metal it has extremely good adhesion qualities.
- Do not apply body filler over top of self-etching primer as it may cause separation of the filler over time.
- Sanding the metal with 80-120 grit sandpaper before applying Self-Etching Primer.

3. Urethane Primer Surfacer

- Urethane Primer is the next coating you should use after epoxy or self-etching primer and filler.
- This is used where you will really want the bodywork to become nice and flat.
- We suggest finishing the surface with 180-220 grit sandpaper before applying urethane primer.

Sprayable Polyester Primer:-

- It builds extremely well, fills minor imperfections in your bodywork, and can be block sanded flat like your body fillers.
- This can be applied over your epoxy or self-etching primer and body filler.

This is used as your final step in the "bodywork" stage to get your panels laser-straight

Q-22. What is masking? Explain different materials used for masking.

Ans. Masking is a technique in which auto body masking tape is applied on the car to mask off the areas that should not be treated or painted.

In order to carry out this process of masking we have range of materials such as:-

- Masking Paper
- Plastic sheet masking

- Masking tapes
- Caps and plugs
- Masking rope
- **Masking Paper**
 1. Paper has been and is the material most used to mask or protect areas not to paint.
 2. It is used to resist the solvents and diluents containing in the paint.
 3. It has low acquisition cost and easy of placement on flat surfaces.
- **Plastic sheet masking**
 1. The plastic sheet masking has been the technological evolution of the paper in masking
 2. It has characteristics of resistance to solvents, temperature and handling.
 3. The main advantage of using these films is the easy adaptation to the contours.
- **Masking tapes**

Among the wide range of masking tapes on the market, we can classify them into three groups:

- General masking tapes
 - Fine masking tapes
 - Trim masking tapes
 - **Plugs and caps**
 1. The use of plugs for masking or covering of nuts and both plain and threaded holes.
- Generally, are made of silicone because of its high resistance to solvents, temperature and handling
- **Masking rope**
 1. Masking rope are self-adhesive foam strips used in holes and openings.
 2. This type of masking material is used on the edges of the doors, hinged covers

The purpose of masking rope is to prevent the penetration of the spray paint into the hole

Q-23. Discuss about paint booth and paint mixing room.

Ans: - Paint mixing room

- Paint mixing room is a place where we mix the the paints according to the requirements.
- It should have colour-corrected artificial lighting and downdraft ventilation.
- Paint mix rooms are generally located next to the spray booth to maximize painter productivity

Benefits of mixing room: -

- **Waste reduction:** - You mix only the amount of paint you need.

- **Time savings:-** Your paint is ready when you need it.
- **Versatility:-** You can match thousands of factory colours

PAINT BOOTH

- Paint booths are walled structures used to safely contain painting and other finishing processes.
- Paint booths are present in a variety of industries including automotive, aviation, manufacturing, millworks, and many more.

In general there are two types of paint booths:

- Non-ducted (open face)
- Directly ducted (enclosed)

REASON TO USE PAINT BOOTH

- Confine the application of a hazardous material to a restricted controlled environment
- Prevent hazardous overspray and volatiles from escaping confinement and causing fire or explosion to nearby operations.
- Control air fuel/mixture so that a combustible combination cannot occur.
- Provide a clean environment in which to paint



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, End Sem. Examination

B. Voc. Program, Semester (2018-19)

Course Code: AUT1105

Time: 3 Hour

Course Name: Automotive electrical fundamental and air conditioning

Max. Marks: 100

Instruction:

1. Answer all questions from section – A, each question carries one mark.
2. Answer any six questions from section – B, each question carries five marks.
3. Answer all questions from section – C, each question carries ten marks.

Section – A

10x02 = 20 Marks

1. What is the unit of voltage?

- A. volt.
- B. Ampere
- C. ohm.
- D. None of the above

2. What is the centre part of atom?

- A. nucleus.
- B. proton.
- C. neutron.
- D. None of the above

3. Current flows in which direction?

- A. Positive to negative.
- B. Negative to positive.
- C. In opposite direction.
- D. Both A & C.

5. Voltage is same in which circuit?

- A. Series circuit.
- B. Both A & B.
- C. Parallel circuit.
- D. None of the above

6. 45 K in °C is

- A. 308
- B. 298
- C. 318
- D. 328

4. Current flow with the help of

- A, PHOTONS
- B, Electrons
- C, Ions
- D, PROTON

7. Refrigerant used in the cars nowadays is
- A. R410
 - B. R32
 - C. R132a
 - D. R134a
8. Evaporator in the car is located:
- A. Under the deck dashboard
 - B. In front of radiator
 - C. Under the chassis
 - D. In the trunk
9. If a gas is contained in an air-tight container what will happen to the pressure of the gas if heat is supplied to the container?
- A. Decrease
 - B. Increase
 - C. Remains same
 - D. None of the above
10. Change of state of material can be represented by:
- A. Solid to Liquid
 - B. Solid to Gas
 - C. Liquid to vapor
 - D. All of the above
11. What is the condition when a thermocouple junction is formed between two metals?
- A. Dissimilar Metal
 - B. Similar Metal
 - C. Al-Cu
 - D. None of the above
12. What is the voltage required for working of acceleration pedal?
- A. 2 V
 - B. 4 V
 - C. 5V
 - D. 4.5V
13. Piezoelectric accelerometer is generally used as:
- A. Pressure sensor
 - B. NOX sensor
 - C. Thermistor
 - D. All of the above

14. Which sensor monitors the top dead sensor position in the piston-cylinder assembly?

- A. CPS
- B. Air fuel- ratio meter
- C. MAF sensor
- D. None of the Above

15. Which sensor measure the speed of the vehicle?

- A. VSS
- B. CPS
- C. MAP
- D. None of the above

16. What is the full form of ODP?

- A. On Direct Potential
- B. Ozone Double Potential
- C. Ozone Depletion Power
- D. Ozone Depletion Potential

17. What is the full form of GWP?

- A. Gross Warming Potential
- B. Global Washing Potential
- C. Global Warming Potential
- D. None of the Above

18. Latent heat of vaporization is rejected in which component of air conditioning cycle?

- A. Compressor
- B. Condenser
- C. Expansion Valve
- D. Evaporator

19. Refrigerator is based on:

- A. Zeroth law of thermodynamics
- B. First law of thermodynamics
- C. Clausius statement of 2nd law of Thermodynamics
- D. Kelvin Planck's statement of 2nd law of Thermodynamics

20. Heat Engine is based on:

- A. Zeroth law of thermodynamics
- B. First law of thermodynamics
- C. Clausius statement of 2nd law of Thermodynamics
- D. Kelvin Planck's statement of 2nd law of Thermodynamics

Section – B

06X05 = 30 Marks

21. Explain how current flows with the help of a diagram.
22. Explain Grounding with the help of a diagram.
23. Name any 5 sensors and explain their working with their applications.
24. What is the role of piezo-electric crystal in working of fuel injector?
25. Define the following:
 - a. Ozone Depletion Potential
 - b. Global Warming Potential
26. Write both statements of Second law of thermodynamics.
27. What are the major components of a refrigeration cycle? Write the functions of each component.
28. Write a short note on:
 - a. Specific Heat
 - b. Latent Heat

Section – C

10X05 = 50 Marks

29. Explain electromagnetic induction and process of inducing current in a circular coil.
30. Explain the need of temperature sensor in engine block and describe the consequences if temperature sensors get damaged.
31. Explain the difference between a heat engine, heat pump and refrigerator with the help of a diagram. Also write the COP for each.
32. Describe the desired properties of a refrigerant used in a refrigeration cycle.
33. Explain the law on which the working of a thermometer is based. Draw a diagram to illustrate the law.



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, End Sem. Examination

B. Voc. Program, Semester (2018-19)

Course Code: AUT1105

Time: 3 Hour

Course Name: Automotive electrical fundamental
and air conditioning

Max. Marks: 100

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

10x02 = 20 Marks

1. What is the unit of voltage?

- A. volt.
- B. Ampere
- C. ohm.
- D. None of the above

2. What is the centre part of atom?

- A. nucleus.
- B. proton.
- C. neutron.
- D. None of the above

3. Current flows in which direction?

- A. Positive to negative.
- B. Negative to positive.
- C. In opposite direction.
- D. Both A & C.

4, Current flows with help of —
Ans :- Electrons (B)

5. Voltage is same in which circuit?

- A. Series circuit.
- B. Both A & B.
- C. Parallel circuit.
- D. None of the above

6. 45 K in °C is

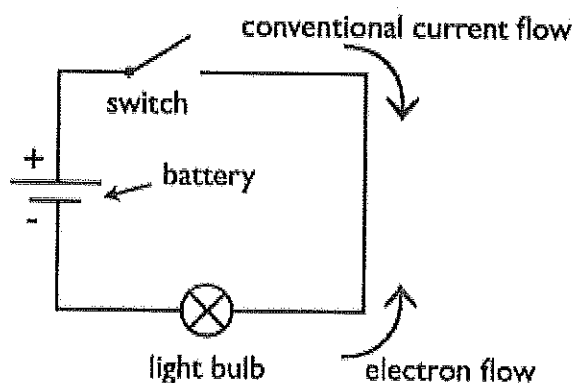
- A. 308
- B. 298
- C. 318
- D. 328
- E.

7. Refrigerant used in the cars nowadays is
- R410
 - R32
 - R132a
 - R134a**
8. Evaporator in the car is located:
- Under the deck dashboard**
 - In front of radiator
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 - In the trunk
9. If a gas is contained in an air-tight container what will happen to the pressure of the gas if heat is supplied to the container?
- Decrease
 - Increase**
 - Remains same
 - None of the above
10. Change of state of material can be represented by:
- Solid to Liquid
 - Solid to Gas
 - Liquid to vapor
 - All of the above**

Section – B

06X05 = 30 Marks

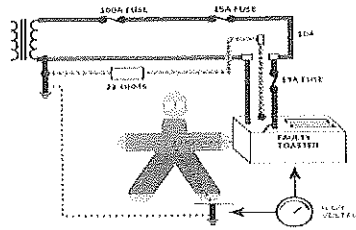
11. How does the current flows in an electrical circuit? Draw diagram.



12. Write about the grounding process with the help of diagram.

Grounding of electrical equipment. Conductive materials enclosing electrical conductors or equipment, or forming part of such equipment, shall be connected to earth so as to limit the voltage to ground on these materials.

The process of connecting metallic bodies of all the electrical apparatus and equipment to huge mass of earth by a wire having negligible resistance is called Earthing.



13. Name any 5 sensors and write their working and application.

14. Define the following:

a) Ozone Depletion Potential

The Ozone Depletion Potential (ODP) is a number that refers to the amount of ozone depletion caused by a substance. The ODP is the ratio of the impact on ozone of a chemical compared to the impact of a similar mass of CFC-11. Thus, the ODP of CFC-11 is defined to be 1.0

b) Global Warming Potential

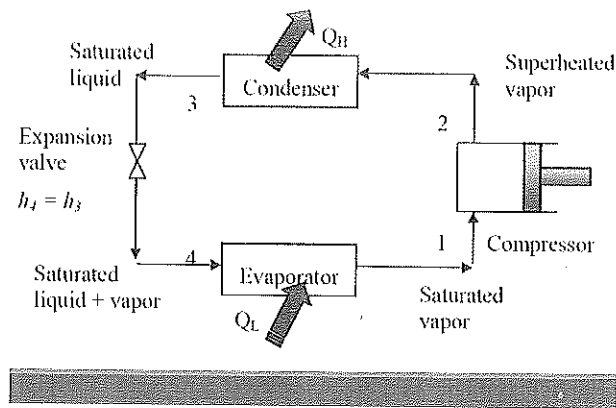
Global warming potential is a relative measure of how much heat a greenhouse gas traps in the atmosphere. It compares the amount of heat trapped by a certain mass of the gas in question to the amount of heat trapped by a similar mass of carbon dioxide.

15. Write both statements of Second law of thermodynamics.

- Kelvin-Planck's statement is based on the fact that the efficiency of the heat engine cycle is never 100%. This means that in the heat engine cycle some heat is always rejected to the low temperature reservoir. The heat engine cycle always operates between two heat reservoirs and produces work.
- Clausius - "It is impossible to construct a device which, operating in a cycle, will produce no effect other than the transfer of heat from a colder to a hotter body." The statement says that to transfer the heat from low temperature to high temperature reservoir some external work should be done on the cycle. This statement has been the basis for the working for all refrigerators, heat pumps and air-conditioners.

16. What are major components of a refrigeration cycle? Write the function of each component.

Vapor-Compression Refrigeration Cycle: This refrigeration cycle is approximately a Rankine cycle run in reverse. A working fluid (often called the refrigerant) is pushed through the system and undergoes state changes (from liquid to gas and back). The latent heat of vaporization of the refrigerant is used to transfer large amounts of heat energy, and changes in pressure are used to control when the refrigerant expels or absorbs heat energy.

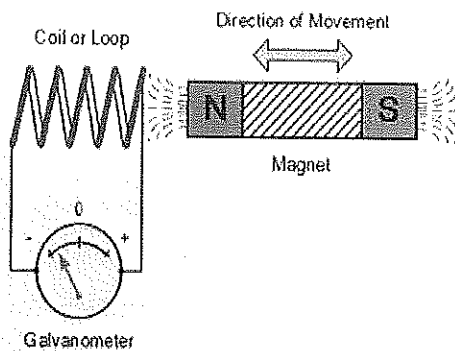


Section – C

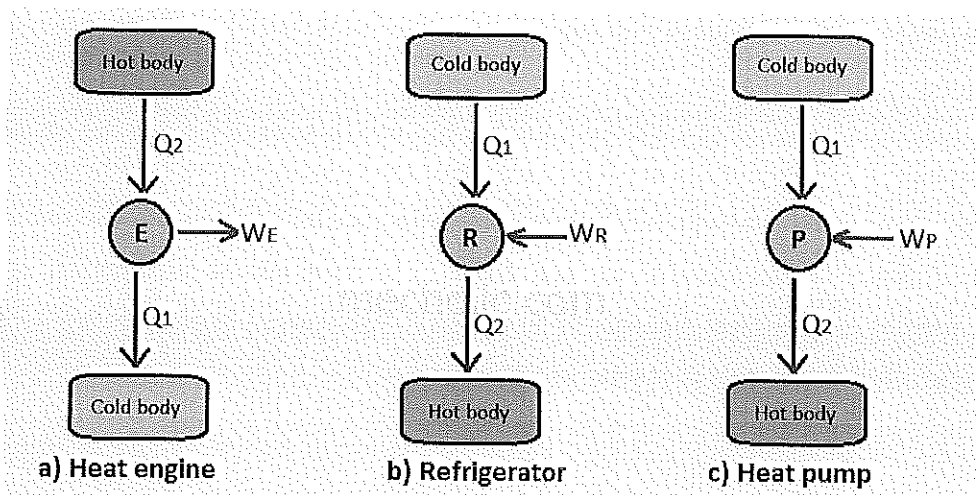
10X05 = 50 Marks

17. Explain electromagnetic induction and process of inducing current in a circular coil

Electromagnetic Induction or Induction is a process in which a conductor is put in a particular position and magnetic field keeps varying or magnetic field is stationary and a conductor is moving. This produces a Voltage or EMF (Electromotive Force) across the electrical conductor.



18. Explain the need of temperature sensor in engine block and describe the consequences if temperature sensors get damage.
19. Explain the difference between a heat engine, heat pump and refrigerator with the help of a diagram. Also write the COP for each.



20. Describe the desired properties of a refrigerant used in a refrigeration cycle.

Properties of refrigerants

Low boiling point and high latent heat of vaporization

Dense vapor

Low toxicity

Non flammable

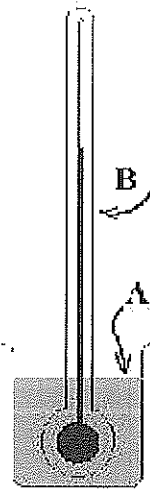
Low miscibility with oil

Low cost

21. Explain the law on which the working of a thermometer is based. Draw diagram to illustrate the law.

The "Zeroth Law" of Thermodynamics

- A system is in thermal equilibrium with another system if they are in "thermal contact" (can exchange heat) and if no thermodynamic variable of either system is changing.
- **The Zeroth Law:** If system B is in thermal equilibrium with both system A and with system C, then system A is in thermal equilibrium with system C.
- Therefore temperature is meaningful as a property of thermal equilibrium.





BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

1st Semester, End-Sem. Examination

B. Voc. Program, Summer Semester (2018-19)

Course Code: AUT1106

Time: 3 Hour

Course name: Automotive Tools and Measurement

Max. Marks:100

Instructions: (i) Attempt all questions from Section A and Section C.

(ii) Attempt any six question from Section B.

Section-A

(2 X 10 = 20)

1. (a) The function of the lower jaws of Vernier caliper is to measure the diameter of an object such as a tube, sphere or cylinder. (inner/outer).
(b) The function of the upper jaws of Vernier caliper is to measure the diameter of an object such as a tube, pipe or hollow cylinder. (inner/outer).
2. (a) The minimum measurement that can be taken by an instrument is known as(minimum count/least count).
(b) Least count of a micrometer is(0.001/0.01)
3. (a) Smooth File is used for (metal removal/ surface finishing).
(b) Rough File is used for(metal removal/ surface finishing).
4. (a) In automotive workshop the equipment used for raising the vehicle from ground level to a certain height is known as(two-post lift/jib crane)
(b) The equipment used for balancing of wheels is called(wheel aligner/wheel balancer).
5. (a) grinders are fitted to a bench or table and are useful for light duty work. (Pedestal/Bench).
(b) Process of making a fresh hole on a work-piece is known as..... (drilling/boring).
6. (a) Spanners are used for operating(Threaded fasteners/Nails).
(b) The angle between top face of cutting point and normal to work surface at cutting edge is known as(Clearance/Rake) angle.
7. (a) Still son pipe wrenches are used for gripping and turning of (pipes/bolts).
(b) Material used to make a file is(high speed steel/mild steel).
8. (a) The teeth of a single cut file are at an angle of to the center line of file. (60 degree/70 degree).
(b) The hacksaw is used to cut and contours (slots/splines).
9. (a) Material used to make Chisels are(Aluminum alloy/Chrome Vanadium steel).
(b) have a pair of legs joined by a pivot, hinge or fulcrum pin. (spanners/pliers).



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10. (a) In first angle projection we draw left side view on the of front view.(left side/right side).
(b) In third angle projection we draw right side view on the of front view.(left side/right side).

Section-B

(5 X 6= 30)

11. Write short notes on: (a) Hammers (b) Pliers
12. What is micro meter? Draw a labelled sketch of a micrometer.
13. Define least count. Find out the least count of Vernier calipers and Micrometer.
14. List out six major equipment of an automotive workshop and mention the applications of each.
15. What are the purpose and requirements of Clamping device? Draw a neat and labelled sketch of a clamping device.
16. What is scaling? Write about different types of scaling used in drawing.
17. What are Mallets? Write about the types and applications of different types of mallets.
18. Write are the differences between first angle and third angle.

Section-C

(10 X 5= 50)

19. Explain the following types of chisels with the help of a schematic diagram: (a) Flat Chisel (b) Cross-Cut Chisel (c) Half Round Nose Chisel (d) Web/Punching Chisel
20. Discuss the various types of Nuts.
21. Explain the features of a bench Drilling Machine. What is the difference between cutting speed and R.P.M.?
22. Explain different types of vices.
23. Explain different types of wrenches and spanners.

Registration No.....

SCHOOL OF AUTOMOTIVE SKILLS
END-SEMESTER EXAMINATION – 2018
B.VOC. COURSE

Course Code: AUT1106

Time: 3 Hour

Course name: Automotive Tools and Measurement

Max. Marks:100

Instructions: (i) Attempt all questions from Section A and Section C.

(ii) Attempt any six question from Section B.

Section-A

(2 X 10 = 20)

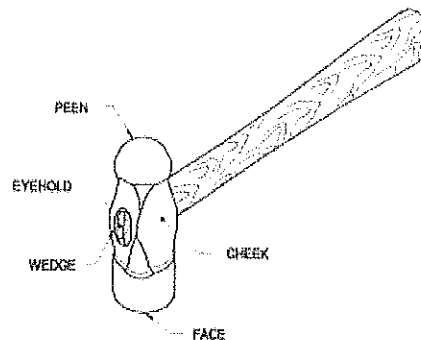
1. (a) The function of the lower jaws of Vernier caliper is to measure the **OUTER** diameter of an object such as a tube, sphere or cylinder. (inner/outer).
(b) The function of the upper jaws of Vernier caliper is to measure the **INNER** diameter of an object such as a tube, pipe or hollow cylinder. (inner/outer).
2. (a) The minimum measurement that can be taken by an instrument is known as **LEAST COUNT** (minimum count/least count)
(b) Least count of a micrometer is **0.01** (0.001/0.01)
3. (a) Smooth File is used for **SURFACE FINISHING** (metal removal/ surface finishing).
4. (b) Rough File is used for **METAL REMOVAL** (metal removal/ surface finishing).
5. (a) In automotive workshop the equipment used for raising the vehicle from ground level to a certain height is known as **TWO-POST LIFT** (two-post lift/jib crane)
(b) The equipment used for balancing of wheels is called **WHEEL BALANCER** (wheel aligner/wheel balancer).
6. (a) **BENCH** grinders are fitted to a bench or table and are useful for light duty work. (Pedestal/Bench).
(b) Process of making a fresh hole on a work-piece is known as **DRILLING** (drilling/boring).
7. (a) Spanners are used for operating **THREADED FASTENER** (Threaded fasteners/Nails).
(b) The angle between top face of cutting point and normal to work surface at cutting edge is known as **RAKE ANGLE** (Clearance/Rake) angle.
8. (a) Still son pipe wrenches are used for gripping and turning of **PIPES** (pipes/bolts).
(b) Material used to make a file is **HIGH SPEED STEEL** (high speed steel/mild steel).
9. (a) The teeth of a single cut file are at an angle of **60 DEGREE** to the center line of file. (60 degree/70 degree).
(b) The hacksaw is used to cut **SLOTS** and contours (slots/splines).
10. (a)) Material used to make Chisels are **CHROME VANADIUM STEEL**(Aluminium alloy/Chrome Vanadium steel).
(b) **PLIERS** have a pair of legs joined by a pivot, hinge or fulcrum pin. (spanners/pliers).

Section-B

(5 X 6= 30)

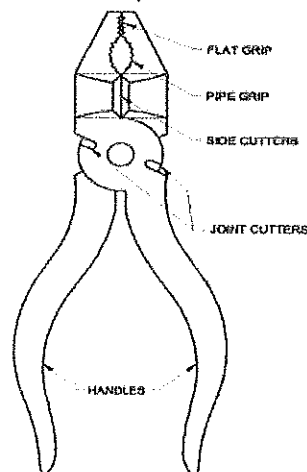
11. (a) Hammers: An engineer's hammer is a hand tool used for striking purposes while: Punching, Bending, Straightening, Chipping, Forging & Riveting. The major parts of hammer are hammer head and a handle. The head is made of drop forged carbon steel, while wooden handle must be capable of absorbing shocks. The parts of hammer head are:

- Face
- Peen
- Cheek
- Eyehole
- Wedge



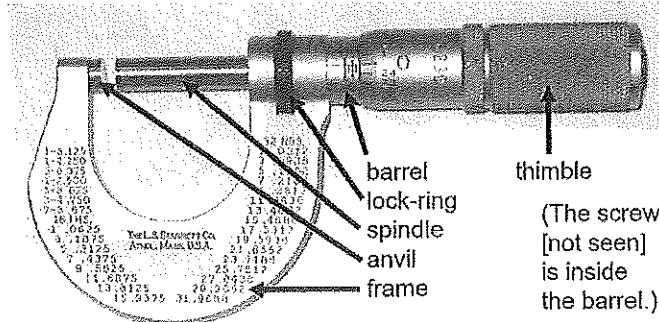
(b) Pliers: Pliers have a pair of legs joined by a pivot, hinge or fulcrum pin (combination pliers)

- Each leg consists of long handle and a short jaw
- Elements of pliers:
 - Flat Jaw: Serrated for general gripping
 - Pipe Grip: serrated for gripping cylindrical objects
 - Side Cutters: for cutting off soft wires
 - Joint Cutters: two joint cutters for cutting or shearing off steel wires
 - Handles: for applying pressure by hand
- Available in sizes from 150 mm to 230 mm (Size = Overall length)



12. What is micro meter? Draw a labelled sketch of a micrometer.

A micrometer is a tool used for the precise measurement of very small objects. A micrometer can measure the depth, length and thickness of whatever object fits between its anvil and spindle. It is commonly used in mechanical engineering and machining applications.



13. Define least count. Find out the least count of Vernier calipers and Micrometer.

The smallest value that can be measured by the measuring instrument is called its least count. Measured values are good only up to this value.

Divide 1 cm into that much number of divisions; the value obtained is the least count of the main scale in cm. For example, if there are 10 divisions in one centimeter of the main scale its least count = $1/10 = 0.01$ cm. Number of divisions on Vernier scale : In most Vernier calipers, the vernier scale has 10 divisions.

One small division on main scale = 1 mm

No. of divisions on Vernier scale = 50

50

Vernier scale divisions = 49 divisions on main scale (or 49 mm)

Each division on Vernier scale = $(49/50)$ mm

Difference between one main scale division and one Vernier scale division = 1

-
 $(49/50)$ mm

= $(50$

-
 $49)/50$

= $(1/50)$ mm

= 0.02 mm

14. List out six major equipments of an automotive workshop and mention the applications of each.

- Two post lift
- Wheel balancer
- Wheel alignment machine
- Tyre changer
- A.C. Recovery Machine
- Paint Booth

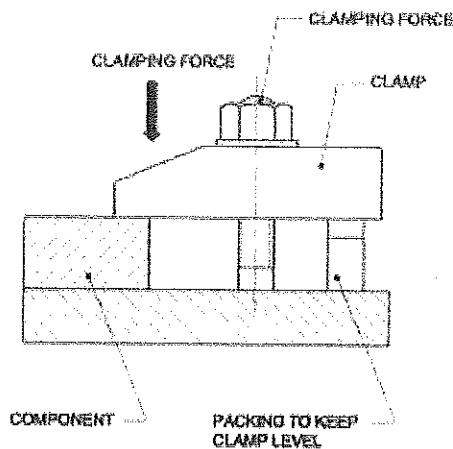
15. What are the purpose and requirements of Clamping device? Draw a neat and labelled sketch of a clamping device.

Clamps are used for preventing the movement of work and for holding the job tight

Requirements of clamping devices

- a. Should be able to manipulate for easy loading
- b. Should provide the required clamping force
- c. Should be capable of locking with minimum movement
- d. Should accommodate a range of sizes of jobs

A typical clamping device employs a screw and nut to provide the clamping force.



16. What is scaling? Write about different types of scaling used in drawing.

Ans Scaling is defined as the enlarging or reducing of actual drawing for purpose of easy understanding and reading.

Types of scaling:-

1. Reducing scale
2. Enlarging scale
3. Actual/same scale

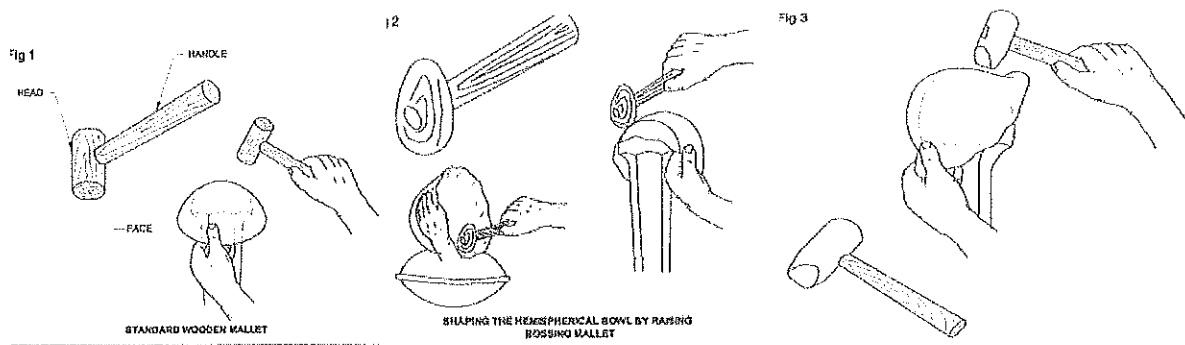
17. What are Mallets? Write about the types and application of different types of mallets.

Mallets are soft hammers made of raw hide, hard rubber/copper, lead or wood

Standard wooden mallets are used for general purpose work like flattening, bending etc.

Bossing mallets are used for hollow panel beatings etc.

End Faked mallets are used for stretching, hammering etc.



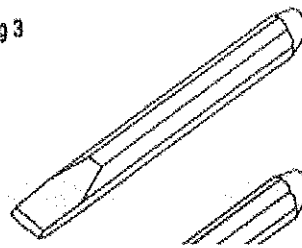
18. Write the differences between first angle and third angle

Section-C

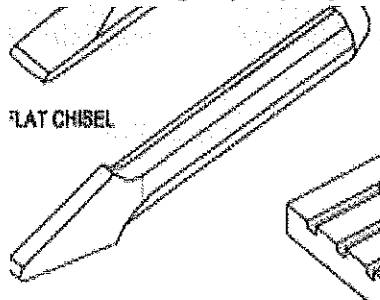
(10 X 5= 50)

19. (a) Flat Chisel: They are used to remove the metal from large flat surfaces and to chip excess metal from weld joints and castings.

Fig 3

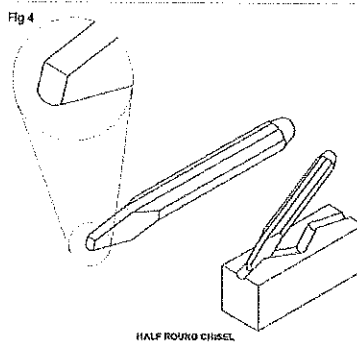


(b) Cross-Cut Chisel: They are used for cutting keyways, grooves and slots.

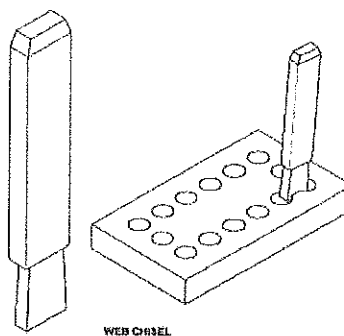


FLAT CHISEL

(c) Half Round Nose Chisel: Half Round Nose chisels are used or cutting grooves



(d) Web/Punching Chisel: Web/ Punching Chisels are used for separating metals after chain drilling



20. Discuss the various types of Nuts.

Ans Nuts of different types are used depending on the requirement of the assembly.

There are different types of nut:

Hexagonal nuts:- This is the most commonly used nut in structures and machine tool construction

Hexagonal nuts are available in different thicknesses, thin nuts are used as lock nuts

Square nuts:- Square nuts are provided with square bolts and are most commonly used in coaches

Self locking nuts:- Also known as Simmonds lock nut

This nut has an internal groove cut in which a fiber or nylon ring is inserted

This ring holds the nut tightly on the bolt and serves as a locking device

Self locking nuts are not used with studs.

T- nuts:- T –nuts are used along with studs on machine tools for fixing/holding devices or work-pieces

Slotted & Castle nuts:- Bolts are used with nuts to clamp two parts together

When bolts and nut are used, if thread is stripped a new bolt and nut can be used

But incase of a screw directly fitted in component, when threads are damaged the component may need an extensive repair or damage

21. Explain the features of a bench Drilling Machine. What is the difference between cutting speed and R.P.M.?

22. Explain different types of vices.

There are different types of vices used for holding work-pieces:

Quick releasing vice:- It is similar to an ordinary bench vice but the opening for movable jaw is done by using a trigger or lever

If the lever at the front movable jaw is pressed the nut disengages the screw and the movable jaw can be set in any desired place quickly

Pipe vice:- Pipe vice is used for holding round sections of metal and pipes

- In this vice the screw is vertical and movable
- The jaw works vertically
- The pipe vice grips the work at four points on its surface

Hand vice:- Hand vices are used for gripping screws, rivets small drills and other similar objects which are too small to be conveniently held in bench vice

A hand vice is made in various shapes and sizes

The length varies from 125-150 mm and jaw width from 40-44 mm

The jaws can be opened and closed using the wing nut on the screw that is fastened to one leg and passes through the other

Pin vice:- The pin vice is used for holding small diameter jobs

It consists of a handle and a small collet chuck at one end

The chuck carries a set of jaws which are operated by turning the handle

23. Explain different types of wrenches and spanners.

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

Types of Wrenches:

- Still Son Pipe Wrench
- Footprint Pipe Wrench
- Tension Wrench
- Hexagon Socket Wrench