



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:

School of Automotive Skills
Session: 2021-22 (summer semester)
B. Voc. Program, Vth Semester,
End-Sem. Examination
SET : "A"

Course Code: AUT 1501

Time: 2 Hours

Course Name: AUTOMOTIVE MECHATRONICS SYSTEM

Max. Marks: 50

Instruction:

1. Non Programmable Scientific Calculators are permitted.
2. Any assumptions made in attempt of questions may be mentioned.
3. All questions are compulsory.

Section – A

10X01 = 10 Marks

1. Which of the following is an example of radial type pump?
(a) Low pressure pump (b) High pressure pump
(c) ECU (d) Common rail
2. Which of the following does not depend on fuel quantity injected?
(a) System pressure (b) Duration of Injection
(c) Size and shape of Nozzle (d) Alternator
3. Proximity sensors are used to :
(a) Detect Non-Magnetic but conductive Materials (b) Measure strain
(c) Measure Distance (d) Both (b) & (c)
3. Which of the following is not component of Common Rail fuel Injection system?
(a) ECU (b) Injector
(c) Spark Plug (d) Electric fuel pump
5. The following is (are) the type(s) of nozzle tip employed in injectors :
(a) Single hole (b) Multiple Hole
(c) Pintle Orifice (d) All of the Above
6. What is the function of Pump in an automatic brake system?
(a) For fault detection (b) To sense the speed of the Vehicle
(c) To restore Pressure (d) To calculate the Acceleration and deceleration



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7. The TCS gets activated when throttle input and engine torque are mismatched to road surface conditions:
- (a) True (b) None of the above
(c) Incomplete information (d) false
8. In multiple injections in CRDI the Pre/ Pilot Injections lead to.....
- (a) Reduce emissions (b) Reduce NOx
(c) Reduce noise (d) Reduce noise & NOx
9. The main function of exhaust muffler is :
- (a) optimization of exhaust efficiency (b) Reduction of exhaust noise
(c) Reduction of NOx in exhaust (d) none of the above
10. Hill descent control is a.....
- (a) Safety function (b) Comfort function
(c) Navigation function (d) Convenience function

Section – B

04X04 = 16 Marks

11. What is CRDI system and explain the High and low pressure side in system.
12. Explain fuel temperature sensor with principle and construction.
13. What are the differences between Active and Passive sensors? Explain with examples.
14. Explain rail pressure sensor regulating valve with diagram.

Section – C

04X06 = 24 Marks

15. Explain ABS and ESP in Braking system.
16. Explain in detail construction how MAF sensor (hot wire type) works.
17. Explain High Pressure pump (Radial type) with components on it.
18. Explain Micromechanical pressure sensor with construction with Application and principle?

Vikram



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Section – A

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1. Which of the following is an example of radial type pump?

- | | |
|-----------------------|------------------------|
| (a) Low pressure pump | (b) High pressure pump |
| (c) ECU | (d) Common rail |

Ans: b

2. Which of the following does not depend on fuel quantity injected?

- | | |
|------------------------------|---------------------------|
| (a) System pressure | (b) Duration of Injection |
| (c) Size and shape of Nozzle | (d) Alternator |

Ans: d

3. Proximity sensors are used to ?

- | | |
|--|--------------------|
| (a) Detect Non-Magnetic but conductive Materials | (b) Measure strain |
| (c) Measure Distance | (d) Both (b) & (c) |

Ans: c

3. Which of the following is not component of Common Rail fuel Injection system?

- | | |
|----------------|------------------------|
| (a) ECU | (b) Injector |
| (c) Spark Plug | (d) Electric fuel pump |

Ans: c

5. The following is (are) the type(s) of nozzle tip employed in injectors

- | | |
|--------------------|----------------------|
| (a) Single hole | (b) Multiple Hole |
| (c) Pintle Orifice | (d) All of the Above |

Ans: d



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6. What is the function of Pump in an automatic brake system?

- (a) For fault detection
- (b) To sense the speed of the Vehicle
- (c) To restore Pressure
- (d) To calculate the Acceleration and deceleration

Ans: c

7. The TCS gets activated when throttle input and engine torque are mismatched to road surface conditions:

TRUE/FALSE

Ans: True

8. In multiple injections in CRDI the Pre/ Pilot Injections lead to.....

- (a) Reduce emissions
- (b) Reduce NOx
- (c) Reduce noise
- (d) Reduce noise & NOx

Ans: d

9. The main function of exhaust muffler is?

- (a) optimization of exhaust efficiency
- (b) Reduction of exhaust noise
- (c) Reduction of NOx in exhaust
- (d) none of then above

Ans: b

10. Hill descent control is a.....

- (a) Safety function
- (b) Comfort function
- (c) Navigation function
- (d) Convenience function

Ans: a

Section – B

04X04 = 16 Marks

11. What is CRDI system and explain the High and low pressure side in system?

Ans: The term CRDi stands for Common Rail Direct Injection. The technology directly injects fuel into the cylinders of a diesel engine through a single, common line, known as the common rail. The common rail is connected to all the fuel injectors.

High pressure side- high pressure side initiates after the high pressure pump when fuel highly compressed /pressurized for the injection through common rail used as a storage for the injection then to the injectors

Sensors at the high pressure side :quantity control valve , fuel temp sensor, rail pressure sensor, pressure regulating valve

Low pressure side- fuel from the tank is passed through fuel feed module or low pressure pump at 9-12 bar, then to the fuel filter to the high pressure pump.



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12. Explain fuel temperature sensor with principle and construction?

Ans: Location-

- The fuel temperature sensor is located on the right at the high-pressure pump.

Task-

- It detects the temperature of the fuel flowing in the high pressure pump and passes this information onto the CDI control unit.

Function-

- The NTC measuring resistor alters its electrical resistance in line with the fuel temperature. The electrical resistance decreases as the fuel temperature rises.
- If the fuel delivered to the common rail high pressure pump goes above 90 degree C, the injection quantity and rail pressure are automatically reduced
- This causes the fuel less to be less compressed.

13. What are the differences between Active and Passive sensors? Explain with examples.

Ans: Remote sensing systems which measure energy that is naturally available are called passive sensors. Eg: rain sensor, thermal sensors

Active sensors, on the other hand, provide their own energy source for illumination eg: gps, infrared.

14. Explain rail pressure sensor with diagram?

Ans: Location

- The rail pressure sensor is screwed into the right rail at the rear.

Task

- The rail pressure sensor is used to detect the current rail pressure and send it to the CDI control unit.

Function

- The rail pressure applied influences the location of a membrane which is fitted with a sensor element.
- A change in the location of a membrane alters the electrical resistance of the sensor element
- This change in resistance causes a voltage signal which is evaluated by the CDI control unit to detect pressure

Section – C

04X06 = 24 Marks

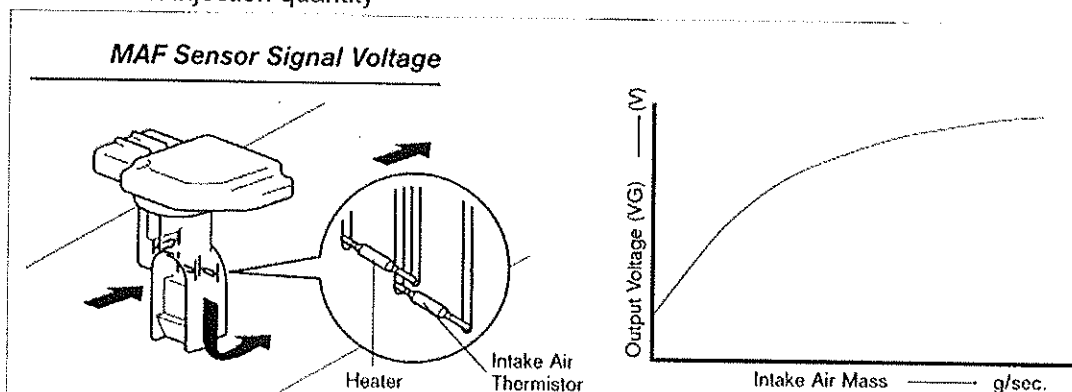
15. Explain ABS and ESP in Braking system?

- Ans: **ABS**-In a vehicle, wheel speed sensors are located on the wheels that monitor the speed of each wheel. The electronic control unit (ECU) reads the signal from each sensor. After the speed sensors detect that the speed of any of the wheel(s) is reducing drastically compared to others, the ECU sends the signal to the valves of the respective wheel(s) to reduce the brake pressure, and the valves get closed.
- After this, the wheels start to accelerate again, and the signal is sent to the ECU one more time, which in turn sends the signal to open the valve and increase the brake pressure, and hence, brakes are applied.
- The cycle repeats itself until the application of brakes becomes normal.

ESP- that improves a vehicle's stability by detecting and reducing loss of traction (skidding). When ESC detects loss of steering control, it automatically applies the brakes to help steer the vehicle where the driver intends to go. Braking is automatically applied to wheels individually, such as the outer front wheel to counter oversteer, or the inner rear wheel to counter understeer. Some ESC systems also reduce engine power until control is regained. ESC does not improve a vehicle's cornering performance; instead, it helps reduce the chance of the driver losing control of the vehicle.

16. Explain in detail construction how MAF sensor (hot wire type) works?

- Ans: The Mass Air Flow Sensor measures the amount of air volume flowing into a car's engine, and sends the Electronic Control Unit (ECU) a voltage that represents the airflow
- A portion of the intake air from the air cleaner is bypassed into the hot-wire measurement area, where the intake airflow volume is measured. The hot-wire type MAF Sensor responds to temperature changes in the heating element. Changes in the resistance value and current of the heating element are converted into proportional voltage in the control circuit, and then sent to the ECU to calculate the amount of engine intake air volume.
- The intake air temperature sensor also detects the intake air temperature and outputs it to the ECU. Responding to this signal, the ECU judges the air density and corrects the fuel injection quantity



17. Explain High Pressure pump (Radial type) with components on it.

Ans: **Location-**

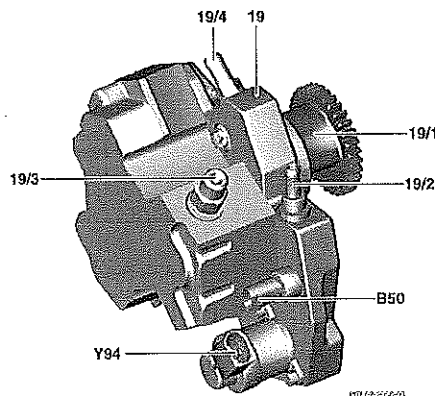
- The high pressure pump is mounted on the cylinder head at the left front.

Task-

- The high-pressure pump is a radial piston pump, with 3 pump elements set at 120°, which compresses the fuel supplied by the fuel pump and thus generates the rail pressure.

Function-

- The high pressure pump conveys the fuel with max. 1600 bar into the high pressure system.
- A dynamic balancer is fitted on the high pressure pump drive for improved smooth operation, which compensates the irregular running (caused by the eccentric in the pump).



High pressure pump (radial piston pump)	
19	High pressure pump
19/1	High pressure pump drive
19/2	Fuel supply line (from fuel filter)
19/3	Fuel high pressure (to rail)
19/4	Fuel return line (to fuel tank)
B50	Fuel temperature sensor
Y94	Volume regulator valve

18. Explain Micromechanical pressure sensor with construction, Application and principle?

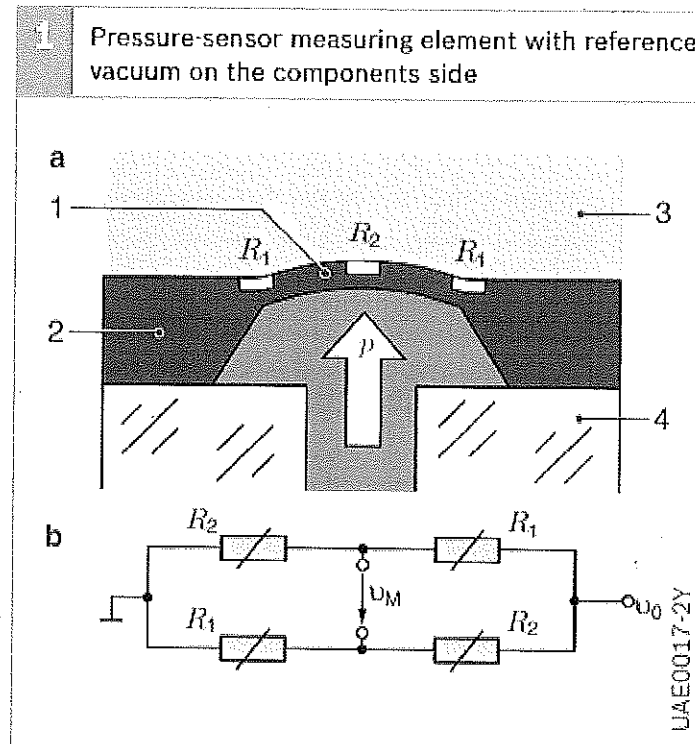
Ans: **Function-** Micromechanical pressure sensors determine the absolute pressure of liquids and gases by measuring the pressure differential in relation to a reference vacuum.

Principle- diaphragm of the sensor cell is deflected to varying degrees depending on the voltages across them. This leads to a change in the measurement voltage U_M . This as yet unamplified voltage is therefore a measure of the pressure applied to the diaphragm.

Application- Intake-manifold pressure, e.g. for load sensing in engine-management systems.

Boost pressure for boost-pressure control Ambient pressure for taking into account air density, e.g. in boost-pressure control .

- Oil pressure to take engine load into account in the service display.
- Fuel pressure for monitoring the level of fuel-filter contamination.



Vijay



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1. Non Programmable Scientific Calculators are permitted.
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Section – A

10X01 = 10 Marks

1. Which of the following is the main aim of an engine management system to achieve?
(a) high reliability and durability with lowest possible initial cost
(b) high power output and torque
(c) low levels of gaseous and particulate emissions
(d) all of the mentioned
2. Hot-wire sensors are used for the measurement of :
(a) Temperature
(b) Pressure
(c) Mass flow rate
(d) Smoke intensity
3. Catalytic converters use lambda sensors to keep :
(a) exhaust temperature constant
(b) exhaust pressure constant
(c) excess air ratio within a range
(d) flow rate of air constant
3. What is the function of an input signal conditioning unit?
(a) To produce control signals
(b) To amplify the signal and convert it into digital form
(c) To perform mechanical work
(d) To produce electrical signals
5. The Anti-lock braking brake system supports electronic stability.
(a) True
(b) False
(c) Maybe (a)
(d) None of the above
6. What is the function of the ECU in Anti-lock braking system?
(a) Monitoring the speed of the vehicle
(b) Decreases the stopping distance
(c) Provides electronic stability
(d) maintaining tractive force



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7. Thermocouples are active transducers?

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

8. A transducer is basically a device which converts ?

- (a) Mechanical energy to electrical
- (b) Energy or information from one form
- (c) Mechanical displacement into electrical
- (d) none of the above

9. The main function of exhaust muffler is?

- (a) optimization of exhaust efficiency
- (b) Reduction of exhaust noise
- (c) Reduction of NO_x in exhaust
- (d) none of the above

10. Hill descent control is a.....

- (a) Safety function
- (b) Comfort function
- (c) Navigation function
- (d) Convenience function

Section – B

04X04 = 16 Marks

11. Explain ESP and TCS.

12. Explain Quantity Control Valve with construction.

13. What is Negative temperature coefficient? and Positive temperature coefficient?

14. Explain Fuel Feed Module with construction.

Section – C

04X06 = 24 Marks

15. Explain Lambda oxygen sensor with construction.

16. Explain with construction knock sensor also symptoms of failure.

17. Explain High Pressure pump (Radial type) with components on it.

18. Explain Micromechanical pressure sensor with construction with Application and principle.

Vishin



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Section – A

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- | | |
|---|----------------------------------|
| (a) high reliability and durability with lowest possible initial cost | (b) high power output and torque |
| (c) low levels of gaseous and particulate emissions | (d) all of the mentioned |

Ans: d

2. Hot-wire sensors are used for the measurement of ?
- | | |
|--------------------|---------------------|
| (a) Temperature | (b) Pressure |
| (c) Mass flow rate | (d) Smoke intensity |

Ans: c

3. Catalytic converters use lambda sensors to keep
- | | |
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| (a) exhaust temperature constant | (b) exhaust pressure constant |
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Ans: c

3. What is the function of an input signal conditioning unit?
- | | |
|--------------------------------|--|
| (a) To produce control signals | (b) To amplify the signal and convert it into digital form |
| (c) To perform mechanical work | (d) To produce electrical signals |

Ans: b

5. The Anti-lock braking brake system supports electronic stability.

- | |
|-----------|
| (a) True |
| (b) False |

Ans: a



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

6. What is the function of the ECU in Anti-lock braking system?

- (a) Monitoring the speed of the vehicle
- (b) Decreases the stopping distance
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- (d) maintaining tractive force

Ans: a

7. Thermocouples are active transducers?

TRUE/FALSE

Ans: True

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Ans: b

10. Hill descent control is a.....

- (a) Safety function
- (b) Comfort function
- (c) Navigation function
- (d) Convenience function

Ans: a

Section – B

04X04 = 16 Marks

11. Explain ESP and TCS ?

Ans: **ESP**-that improves a vehicle's stability by detecting and reducing loss of traction (skidding). When ESC detects loss of steering control, it automatically applies the brakes to help steer the vehicle where the driver intends to go. Braking is automatically applied to wheels individually, such as the outer front wheel to counter oversteer, or the inner rear wheel to counter understeer. Some ESC systems also reduce engine power until control is regained. ESC does not improve a vehicle's cornering performance; instead, it helps reduce the chance of the driver losing control of the vehicle.

TCS- The traction control system (TCS) detects if a loss of traction occurs among the car's wheels. Upon identifying a wheel that is losing its grip on the road, the system automatically



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applies the brakes to that individual one or cut down the car's engine power to the slipping wheel. If the wheels lose their grip on the road, it can lead the car to be unstable, resulting in a dangerous situation. Such traction loss commonly occurs on snowy or icy roads and in rainy weather

12. Explain Quantity control Valve with construction?

Ans: **Location**

The quantity control valve is located on the high pressure pump flange for the high pressure.

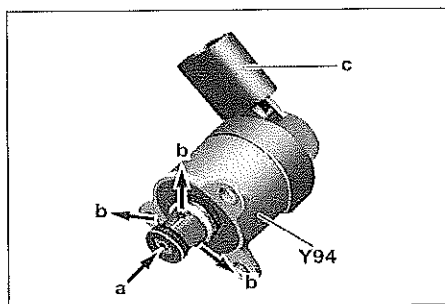
Function

The fuel delivered by the fuel pump with fuel level sensor (M3) passes into the high-pressure pump flange and passed from there through the fuel temperature sensor (B50) to the flow control valve and to the fuel pressure relief valve. The quantity control valve controls the fuel amount according to the signal from the CDI control unit which is led to the 3 pump elements via an annular passage.

Task

The high pressure pump has the following tasks:

- Regulation of the fuel feed to the pump elements on the high pressure pump
- Interruption of fuel supply to the pump element on the high pressure pump by switching off the engine
- Regulation of the rail pressure in co-operation with the pressure regulator valve (Y74), rail pressure sensor (B4/6) and CDI control unit (N3/9)



Y94 Quantity control valve

- a Fuel feed (fuel from the fuel tank)
- b Controlled fuel quantity (to the pump elements of the high pressure pump)
- c Electrical connection

13. What is Negative temperature coefficient and Positive temperature coefficient ?

Ans- in Negative temperature coefficient the resistance will decrease as the temperature increases.

In Positive temperature coefficient the resistance increase as the temperature increases.

14. Explain Fuel feed Module with construction ?

Ans: **Location-**

- The fuel feed module is integral with the fuel tank

Task-

- The fuel feed module ensures delivery of fuel to the fuel pump through the swirl pot when the fuel level in the fuel tank is low and while driving around longer curves.

Function-

- The fuel flows from the electrical fuel pump in the fuel feed module, through the fuel pressure line via the connection to the fuel main filter.
- The fuel pressure is controlled by the fuel pump at 8 bar.



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Excess fuel flows back via the return flow connection through the suction jet pump and the fuel line into the right fuel tank chamber.

- A suction effect is produced in the suction jet pump which draws the fuel from the deepest point out of the left fuel tank chamber and delivers it into the fuel feed module. This ensures that the left chamber is properly emptied.
- The housing of the fuel feed module serves as a swirl pot. When cornering with a low level of fuel in the fuel tank, it prevents the fuel pump drawing in air.

Section – C

04X06 = 24 Marks

15. Explain Lambda oxygen sensor with construction?

- Ans: **Task-** The lambda probe will adjust the fuel amount that is sent to the engine cylinders by optimizing the air and fuel mixture, which in turn will make the engine work properly. This will also impact the harmful gas emissions rate by making sure the catalytic converter is working correctly.
- Location- is a small probe located on the car exhaust, between the exhaust manifold and the catalytic converter.
- Principle- Oxygen sensors work by producing their own voltage when they get hot (approximately 600°F). On the tip of the oxygen sensor that plugs into the exhaust manifold is a zirconium ceramic bulb. The inside and the outside of the bulb is coated with a porous layer of platinum, which serve as the electrodes. The interior of the bulb is vented internally through the sensor body to the outside atmosphere. When the outside of the bulb is exposed to the hot gases of the exhaust, the difference in oxygen levels between the bulb and the outside atmosphere within the sensor causes the voltage to flow through the bulb. If the fuel ratio is lean (not enough fuel in the mixture), the voltage is relatively low — approximately 0.1 volts. If the fuel ratio is rich (too much fuel in the mixture), the voltage is relatively high — approximately 0.9 volts. When the air/fuel mixture is at the stoichiometric ratio (14.7 parts air to 1 part fuel), the oxygen sensor produces 0.45 volts.

16. Explain with construction knock sensor also symptoms of failure ?

- Ans: **LOCATION:-** The knock sensors are located on the top of the crankcase under the intake manifold.
- **TASK:-** The knock sensors detect combustion knocks at excessively high vibrations at the crankcase. Anti-knock control thereby corrects the ignition timing for each individual cylinder when the engine is warm.

Working- The arrangement of this sensor can be done outside of the engine block in the automobile. The main function of this is to record knocking noise within all engine operating conditions to stop engine injury.

The sensor used in the car listens to the sensations which are occurred from the engine block in the car & changes them into electrical voltage signals, which are filtered & estimated inside the control unit.

Failure symptoms-

- An error code can be stored
- Engine power can be reduced



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- Fuel consumption can be increased
- Warning light of the engine will be ON
- Slow acceleration

17. Explain High Pressure pump (Radial type) with components on it.

Ans: **Location-**

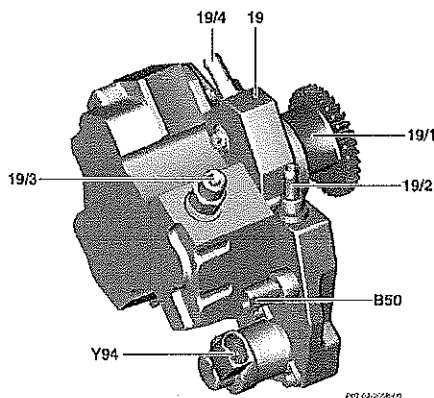
- The high pressure pump is mounted on the cylinder head at the left front.

Task-

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Function-

- The high pressure pump conveys the fuel with max. 1600 bar into the high pressure system.
- A dynamic balancer is fitted on the high pressure pump drive for improved smooth operation, which compensates the irregular running (caused by the eccentric in the pump).



High pressure pump (radial piston pump)

19	High pressure pump	19/4	Fuel return line (to fuel tank)
19/1	High pressure pump drive	B50	Fuel temperature sensor
19/2	Fuel supply line (from fuel filter)	Y94	volume regulator valve
19/3	Fuel high pressure (to rail)		

18. Explain Micromechanical pressure sensor with construction, Application and principle?

Ans: **Function-** Micromechanical pressure sensors determine the absolute pressure of liquids and gases by measuring the pressure differential in relation to a reference vacuum.

Principle- diaphragm of the sensor cell is deflected to varying degrees depending on the voltages across them. This leads to a change in the measurement voltage U_M . This as yet unamplified voltage is therefore a measure of the pressure applied to the diaphragm.

Application- Intake-manifold pressure, e.g. for load sensing in engine-management systems.

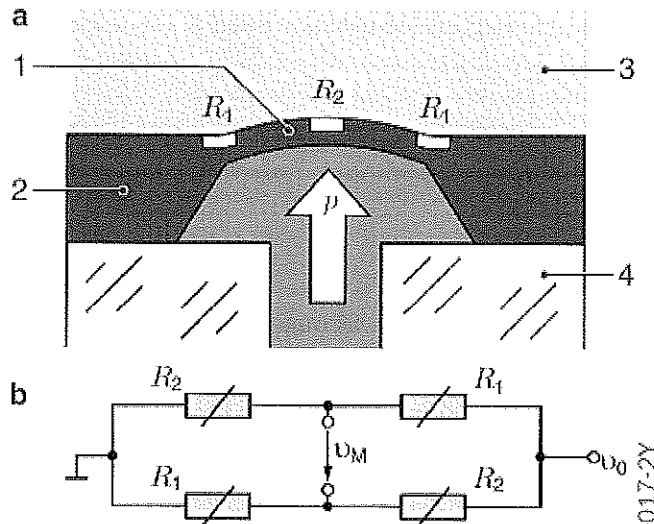
- Boost pressure for boost-pressure control Ambient pressure for taking into account air density, e.g. in boost-pressure control .



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- Oil pressure to take engine load into account in the service display.
- Fuel pressure for monitoring the level of fuel-filter contamination.

1 Pressure-sensor measuring element with reference vacuum on the components side



Vipin



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Registration No.:

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5th Semester, End-Sem. Examination
B. Voc. Program, Summer Semester (2021-22)

Course Code: AUT1502

Time: 2 Hour

Course Name: Automotive Electric System

Max. Marks: 50

Instruction:

1. All the questions are compulsory to attend.
2. Students are not allowed to bring any smart device or cell phone in the exam hall.
3. Marks will be deducted if any overwriting in words will be found.

Section – A

10X01 = 10 Marks

Q-1. Measuring the current with a multimeter...

- | | |
|----------------------------|---------------------------------|
| a. ...it must be in series | c. ...I choose Ω |
| b. ...it must be parallel | d. ...the power [W] must be set |

Q-2. Before measuring the resistance...

- | | |
|--|------------------------------------|
| a. ...I make sure there is current | c. ...I make sure there is voltage |
| b. ...I connect both cables to see 0Ω | d. ...I choose either AC or DC |

Q-3. Measuring the voltage with an ammeter is...

- | | |
|-----------------------|-------------------------|
| a. ...to be in series | c. ...is to be parallel |
| b. ...not possible | d. ...in the unit [V] |

Q-4. Before I even think of using a multimeter...

- | | |
|-----------------------------|-------------------------------------|
| a. ...I clean all contacts | c. ...I need to know what to expect |
| b. ...I take a deep breathe | d. ...I check the cable |

Q-5. The pressure depends on...

- | | |
|--------------------------------------|---------------------------------|
| a. ...the unit either [bar] or [psi] | c. ...the height over sea level |
| b. ...surface per force | d. ...the gas |



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Q-6. An actuator...

- a. ...receives orders from ECU
- b. ...is directly connected to a sensor
- c. ...measures something
- d. ...gives orders to the ECU

Q-7. A unit for the brightness of the light is...

- a. lm
- b. LED
- c. K
- d. Xenon

Q-8. Units for the capacity of a battery are...

- a. 12V, 60A, 5Ah
- b. 24A, 12V
- c. [Ah] [kWh]
- d. 12V, 341A, 620Ah

Q-9. What is the problem with CO₂?

- a. It is toxic
- b. The imbalance, too much production, too less green plants
- c. It is odorless
- d. It causes cancer

Q-10. What figures/units are correct for a spark plug?

- a. 10W-50
- b. 500°C, 15kV
- c. 1.7mm gap, 12V
- d. 341A, 16'000V

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Section – B

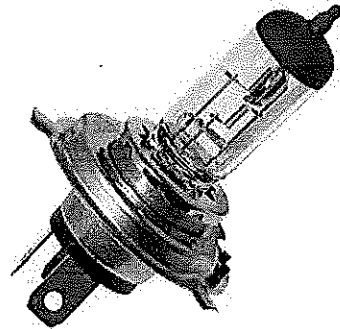
04X04 = 16 Marks

Q-11. Explain the difference between passive and active sensors.

Q-12. Ignition: Name the 3 pins of the hall sensor.

Q-13. Explain Induction.

Q-14. Why are there 3 connections?



Section – C

04X06 = 24 Marks

Q-15. Spark plug: What are the consequences if the gap is not correct? Answer in this form:

Too much gap	Too small gap

Q-16. Name 3 Types of starter motors and draw their circuits.

Q-17. Spark plug: What happens, if you use the wrong sealing?

Q-18. There are several devices helping to engage the drive pinion into the flywheel.
Name 3 of them.

Vipin



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:

School of Automotive Skills
5th Semester, End-Sem. Examination
B. Voc. Program, Summer Semester (2021-22)

Course Code: AUT1502

Course Name: Automotive Electric System

Time: 2 Hour

Max. Marks: 50

Instruction:

1. All the questions are compulsory to attend.
2. Students are not allowed to bring any smart device or cell phone in the exam hall.
3. Marks will be deducted if any overwriting in words will be found.

Section – A

10X01 = 10 Marks

Q-1. Measuring the current with a multimeter...

- | | |
|----------------------------|---------------------------------|
| a. ...it must be in series | c. ...I choose Ω |
| b. ...it must be parallel | d. ...the power [W] must be set |

Q-2. Before measuring the resistance...

- | | |
|--|------------------------------------|
| a. ...I make sure there is current | c. ...I make sure there is voltage |
| b. ...I connect both cables to see 0Ω | d. ...I choose either AC or DC |

Q-3. Measuring the voltage with an ammeter is...

- | | |
|-----------------------|-------------------------|
| a. ...to be in series | c. ...is to be parallel |
| b. ...not possible | d. ...in the unit [V] |

Q-4. Before I even think of using a multimeter...

- | | |
|-----------------------------|-------------------------------------|
| a. ...I clean all contacts | c. ...I need to know what to expect |
| b. ...I take a deep breathe | d. ...I check the cable |

Q-5. The pressure depends on...

- | | |
|--------------------------------------|---------------------------------|
| a. ...the unit either [bar] or [psi] | c. ...the height over sea level |
| b. ...surface per force | d. ...the gas |

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Q-6. An actuator...

- a. ...receives orders from ECU
- b. ...is directly connected to a sensor
- c. ...measures something
- d. ...gives orders to the ECU

Q-7. A unit for the brightness of the light is...

- a. lm
- b. LED
- c. K
- d. Xenon

Q-8. Units for the capacity of a battery are...

- a. 12V, 60A, 5Ah
- b. 24A, 12V
- c. [Ah] [kWh]
- d. 12V, 341A, 620Ah

Q-9. What is the problem with CO₂?

- a. It is toxic
- b. The imbalance, too much production, too less green plants
- c. It is odorless
- d. It causes cancer

Q-10. What figures/units are correct for a spark plug?

- a. 10W-50
- b. 500°C, 15kV
- c. 1.7mm gap, 12V
- d. 341A, 16'000V

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Section – B

04X04 = 16 Marks

Q-11. Explain the difference between passive and active sensors.

Active sensors need a power supply.

Active example: Hall sensor with 3 cables (plus/minus/signal=green cable).

Passive: Inductive sensor with 2 cables (plus/minus producing AC sinus wave)

Q-12. Ignition: Name the 3 pins of the hall sensor.

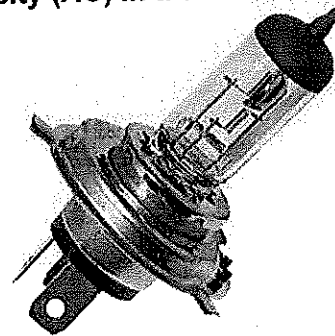
- Power supply plus
- Power supply minus
- Outcoming signal (green cable)

Q-13. Explain Induction.

The changing of a magnetic field produces electricity (AC) in a conductor.

Q-14. Why are there 3 connections?

- High beam 60W
- Low beam 55W
- Ground / minus



Section – C

04X06 = 24 Marks

Q-15. Spark plug: What are the consequences if the gap is not correct? Answer in this form:

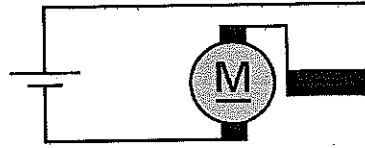
Too much gap	Too small gap
not firing correctly, causing misfires at high speeds, idle not correct, causing pollution	too weak of a spark to complete the combustion process within the engine

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Q-16. Name 3 Types of starter motors and draw their circuits.

Series-wound motor

(main-wound motor)



Shunt motor



Permanent magnet motor



Q-17. Spark plug: What happens, if you use the wrong sealing?

Loss of pressure in combustion chamber, less power, less efficient, thread might be damaged

Q-18. There are several devices helping to engage the drive pinion into the flywheel.
Name 3 of them.

- high helix thread
- beveled teeth / design of the teeth (pinion and flywheel)
- full torque only when the pinion is in mesh with the flywheel

Vijay



Registration No.:

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

5th Semester, End-Sem. Examination

B. Voc. Program, Summer Semester (2021-22)

Course Code: AUT1502

Time: 2 Hour

Course Name: Automotive Electric System

Max. Marks: 50

Instruction:

1. All the questions are compulsory to attend.
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3. Marks will be deducted if any overwriting in words will be found.

Section – A

10X01 = 10 Marks

Q-1. A multimeter measures...

- | | |
|---|---|
| a. Voltage [V], wattage [W],
current [A] | c. Resistance [Ω], current [A] |
| b. Voltage [V], resistance [Ω],
current [A] | d. Power [W], Voltage [V], current [A] |

Q-2. The inner resistance of a voltmeter is...

- | | |
|-----------------------|-------------------------|
| a. about 10k Ω | c. as small as possible |
| b. as big as possible | d. 10A |

Q-3. The inner resistance of a ammeter is...

- | | |
|-------------------------|-----------------------|
| a. as big as possible | c. about 10k Ω |
| b. as small as possible | d. 10A |

Q-4. By measuring the resistance, it is important that...

- | | |
|-----------------------|-------------------------|
| a. there is current | c. there is no current |
| b. there is a voltage | d. it is a copper cable |



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Q-5. Possible units for pressure testing are...

- a. bar, spi, pascal
- b. psi, bar, Nm
- c. bar, psi, dN/cm^2
- d. psi, bar, pound per inch

Q-6. A sensor always needs connection to...

- a. ECU
- b. power supply
- c. actor
- d. ground

Q-7. A unit for the color of the light is...

- a. lm
- b. Lux
- c. K
- d. Candela

Q-8. Specifications you will find on car starter battery:

- a. 12V, 60A, 520Ah
- b. 24A, 12V
- c. 12V, 60Ah, 520A
- d. 12V, 341A, 620Ah

Q-9. Which solution will work, concerning India's problem with CO_2 ?

- a. More electric vehicles
- b. Less population, more plants
- c. Retrofitting ICEs to eVs
- d. Traffic rules

Q-10. What is a reasonable temperature window/range for a spark plug?

- a. 15W-40
- b. 200°C to 300°C
- c. -20°C to 100°C
- d. 500°C to 800°C

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Section – B

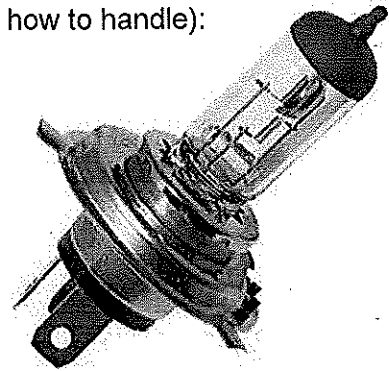
04X04 = 16 Marks

Q-11. Name 2 types of spark plug sealings.

Q-12. Ignition: Name the 2 popular sensors which replaced the mechanical contact breaker.

Q-13. Name 4 effects of the current.

Q-14. Describe this lamp (name, power, characteristics, rules how to handle):



Section – C

04X06 = 24 Marks

Q-15. Explain the meaning of IP67.

Q-16. Name 3 Types of starter motors and draw their circuits.

Q-17. What does the resistance of a cable depend on?

Q-18. There are several devices helping to engage the drive pinion into the flywheel.
Name 3 of them.

Vipin



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.:

School of Automotive Skills
5th Semester, End-Sem. Examination
B. Voc. Program, ~~SU~~ 1st Semester (2021-22)

Course Code: AUT1502

Course Name: Automotive Electric System

Time: 2 Hour

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Section – A

10X01 = 10 Marks

Q-1. A multimeter measures...

- | | |
|--|---|
| a. Voltage [V], wattage [W],
current [A] | c. Resistance [Ω], current [A] |
| b. Voltage [V], resistance [Ω],
current [A] | d. Power [W], Voltage [V], current [A] |

Q-2. The inner resistance of a voltmeter is...

- | | |
|------------------------------|-------------------------|
| a. about 10k Ω | c. as small as possible |
| b. as big as possible | d. 10A |

Q-3. The inner resistance of a ammeter is...

- | | |
|--------------------------------|-----------------------|
| a. as big as possible | c. about 10k Ω |
| b. as small as possible | d. 10A |

Q-4. By measuring the resistance, it is important that...

- | | |
|-----------------------|-------------------------------|
| a. there is current | c. there is no current |
| b. there is a voltage | d. it is a copper cable |



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Q-5. Possible units for pressure testing are...

- a. bar, spi, pascal
- b. psi, bar, Nm
- c. bar, psi, dN/cm^2
- d. psi, bar, pound per inch

Q-6. A sensor always needs connection to...

- a. ECU
- b. power supply
- c. actor
- d. ground

Q-7. A unit for the color of the light is...

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- b. Lux
- c. K
- d. Candela

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- b. 24A, 12V
- c. 12V, 60Ah, 520A
- d. 12V, 341A, 620Ah

Q-9. Which solution will work, concerning India's problem with CO_2 ?

- a. More electric vehicles
- b. Less population, more plants
- c. Retrofitting ICEs to eVs
- d. Traffic rules

Q-10. What is a reasonable temperature window/range for a spark plug?

- a. 15W-40
- b. 200°C to 300°C
- c. -20°C to 100°C
- d. 500°C to 800°C

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Section – B

04X04 = 16 Marks

Q-11. Name 2 types of spark plug sealings.

- flat spark plug sealing
- conical spark plug sealing

Q-12. Ignition: Name the 2 popular sensors which replaced the mechanical contact breaker.

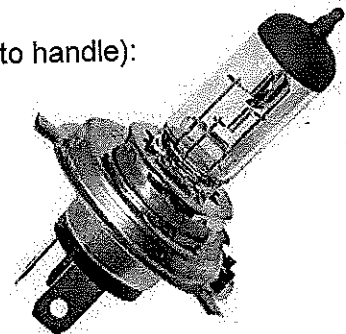
- hall sensor
- inductive sensor

Q-13. Name 4 effects of the current.

- heat
- magnetic field
- light
- chemical effect
- effect on humans and animals (physiognomic effect)

Q-14. Describe this lamp (name, power, characteristics, rules how to handle):

- H4 halogen
- 12V 55/60W
- high and low beam, 3 connections
- don't touch the glass



Section – C

04X06 = 24 Marks

Q-15. Explain the meaning of IP67.

Water and dust proof connectivity products are defined by their Ingress Protection (IP) numbers. The first number after IP is for the part's protection against solid objects like dust and sand. This number can range from 0, meaning no protection against dust and sand, and 6, meaning 100% protection against dust and sand. The second number after IP is for the part's protection against liquids. It ranges from 0 to 8.

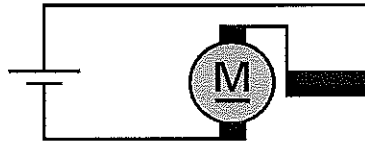
IP67 equipment is the most commonly found in the connectivity market. It is 100% protected against solid objects like dust and sand, and it has been tested to work for at least 30 minutes while under 15cm to 1m of water.

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Q-16. Name 3 Types of starter motors and draw their circuits.

Series-wound motor

(main-wound motor)



Shunt motor



Permanent magnet motor



Q-17. What does the resistance of a cable depend on?

- **material**
- **length**
- **width / diameter**
- **temperature**

Q-18. There are several devices helping to engage the drive pinion into the flywheel.
Name 3 of them.

- **high helix thread**
- **beveled teeth / design of the teeth (pinion and flywheel)**
- **full torque only when the pinion is in mesh with the flywheel**

Vijay

**BHARTIYA SKILL DEVELOPMENT UNIVERSITY****School of Automotive Skill****Session: 2021-22 (Summer Semester)****B. Voc., 5th Semester****End-Sem Examination****Course Code : AUT1503****Time : 2 Hour****Course Name: Workshop Management****Max. Marks : 50****Instructions:**

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

Section – A

10X01 = 05 Marks

1. Which theory gives zero defect principle -
 - a. Kanban
 - b. Kaizen.
 - c. Poke yoke.
 - d. None of the above.
2. What does A in ABC stands for: -
 - a. Always.
 - b. According.
 - c. Anytime.
 - d. None of the Above.
3. Minimum wages act was introduced in: -
 - a. 1947
 - b. Early 90s
 - c. 1948
 - d. 1949
4. Child labor act introduced in: -
 - a. 1986
 - b. 1987
 - c. 1920
 - d. None of the above.
5. Maternity benefits act was introduced in: -
 - a. 1962
 - b. 1961
 - c. 2000
 - d. 1950
6. ESI act introduced in: -
 - a. 1950
 - b. 1979.
 - c. 1948.
 - d. None of the above.
7. What does A in CLRA stands for: -
 - a. Abolition.
 - b. Abort.
 - c. Asylum.
 - d. None of the Above.

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8. Kanban Concept is related to: -

- a. JIT
- b. Lean
- c. JIT and Lean
- d. None of the above

9. What factor increases the time of BEP: -

- a. Loss
- b. Profit
- c. BEA
- d. None of the above.

10. Payment of wages act introduced in: -

- a. 1962
- b. 1936
- c. 2005
- d. 1940

Section – B

04X04 = 16 Marks

- Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example
- How “Seiton” is helpful in for the role of Workshop Manager?
- How you will implement “zero defect” concept in Your job role?
- Explain ABC analysis.

Section – C

04X06 = 24 Marks

- Explain Poke yoke theory with an example of real life.(in steps)
- Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example
- Explain CLRA.
- Categories the below mentioned items in ABC category using the fundamentals of ABC analysis.

Item no.	101	102	103	104	105	106	107	108	109	110	111	112	113	114
Unit cost	2	4	6	8	10	12	2	4	6	8	10	12	2	4
Annual demand	1000	2000	3000	500	400	300	200	100	100	200	300	400	500	600

Vipin

**BHARTIYA SKILL DEVELOPMENT UNIVERSITY****School of Automotive Skill****Session: 2021-22 (Summer Semester)****B. Voc., 5th Semester****End-Sem Examination****Course Code : AUT1503****Time : 2 Hour****Course Name: Workshop Management****Max. Marks : 50****Instructions:**

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Section – A

10X01 = 05 Marks

1. Which theory gives zero defect principle -
 - a. Kanban
 - b. Kaizen.
 - c. **Poke yoke.**
 - d. None of the above.
2. What does A in ABC stands for: -
 - a. Always.
 - b. According.
 - c. Anytime.
 - d. None of the Above.
3. Minimum wages act was introduced in: -
 - a. 1947
 - b. Early 90s
 - c. **1948**
 - d. 1949
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 - a. **1986**
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 - c. 1920
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 - a. 1962
 - b. **1961**
 - c. 2000
 - d. 1950
6. ESI act introduced in: -
 - a. 1950
 - b. 1979.
 - c. **1948.**
 - d. None of the above.
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- a. JIT
- b. Lean
- c. **JIT and Lean**
- d. None of the above

9. What factor increases the time of BEP: -

- a. **Loss**
- b. Profit
- c. BEA
- d. None of the above.

10. Payment of wages act introduced in: -

- a. 1962
- b. **1936**
- c. 2005
- d. 1940

Section – B

04X04 = 16 Marks

1. Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example

Ans. This cause analysis tool is considered one of the seven basic quality tools. The fishbone diagram identifies many possible causes for an effect or problem. A fishbone diagram, as the name suggests, mimics a fish skeleton. The underlying problem is placed as the fish's head (facing right) and the causes extend to the left as the bones of the skeleton; the ribs branch off the back and denote major causes, while sub-branches branch off of the causes and denote root causes.

2. How "Seiton" is helpful in for the role of Workshop Manager?

Ans. Seiton aims at "place for everything and everything in its place". When sorting has been complete, the specific location is defined for the useful material and located in the predefined order (Deshpande, et al., 2015). The main objectives of Seiton are forming a regular workplace strategy, avoiding time loss while searching the material and mistake proofing work. This step involved extra sorting of the items. All like items are located at a place in the shelves and lockers.

3. How you will implement "zero defect" concept in Your job role?

Ans. Zero defects is a way of thinking and doing that reinforces the notion that defects are not acceptable, and that everyone should "do things right the first time." The idea here is that with a philosophy of zero defects, you can increase profits both by eliminating the cost of failure and increasing revenues through.

you're building products to meet customer specifications, the most distinct advantage of achieving Zero Defects is reduction of waste and cost. The benefits are visible: Zero Defects equates to upfront savings, higher customer satisfaction, improved customer loyalty—and higher sales and profits.

Maintain Customer Satisfaction & Loyalty

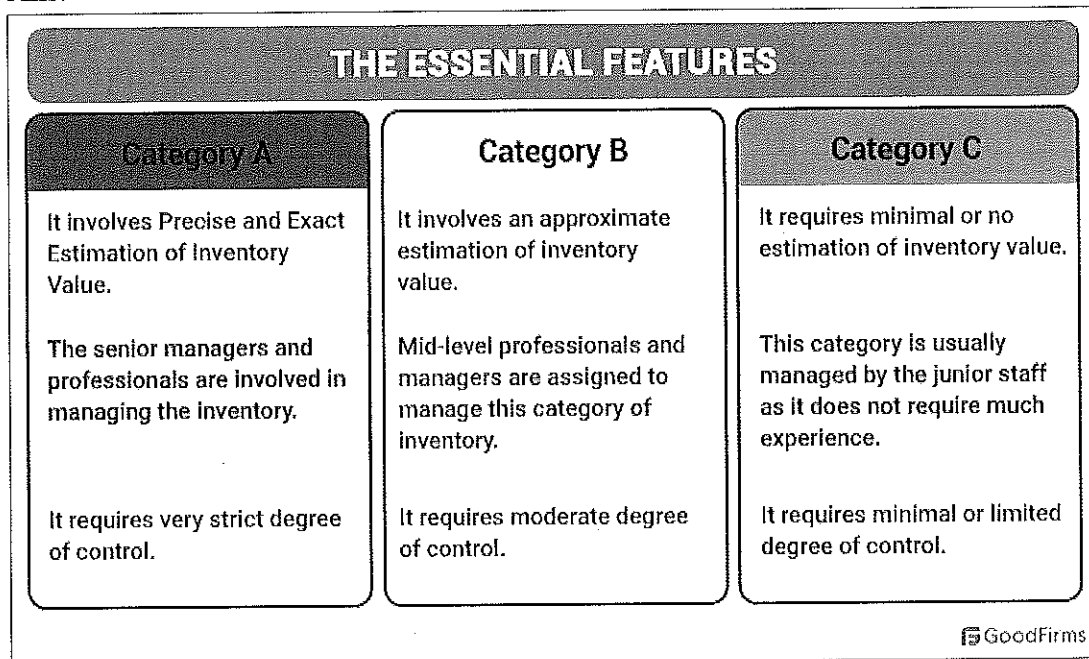
Happy Customers mean more sales!

There is always a cost associated with manufacturing defects.

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4. Explain ABC analysis.

Ans.

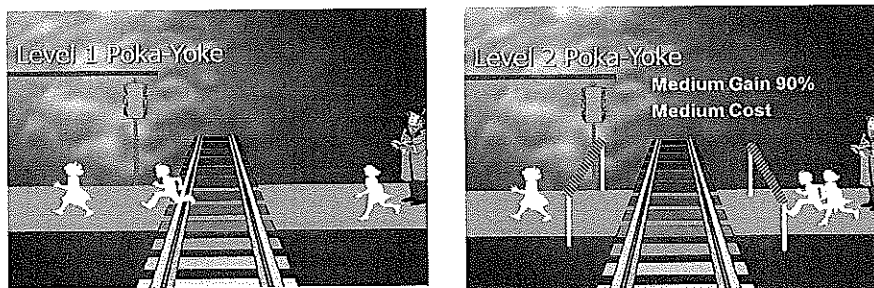


Section – C

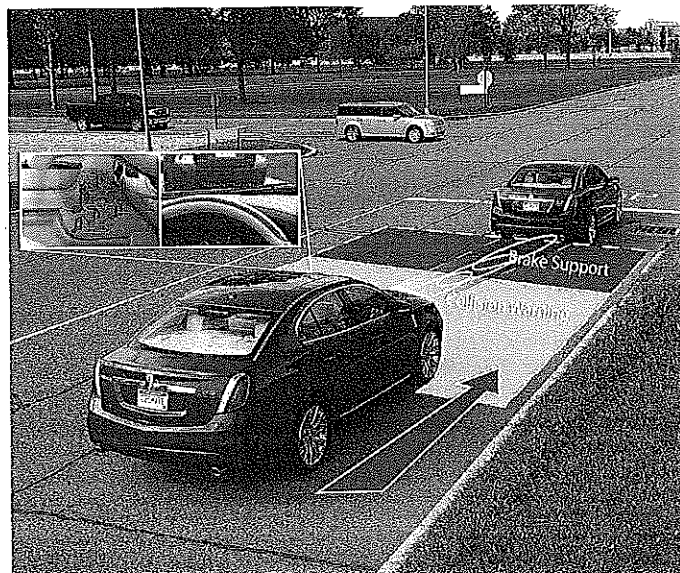
04X06 = 24 Marks

1. Explain Poke yoke theory with an example of real life .(in steps)

Ans.



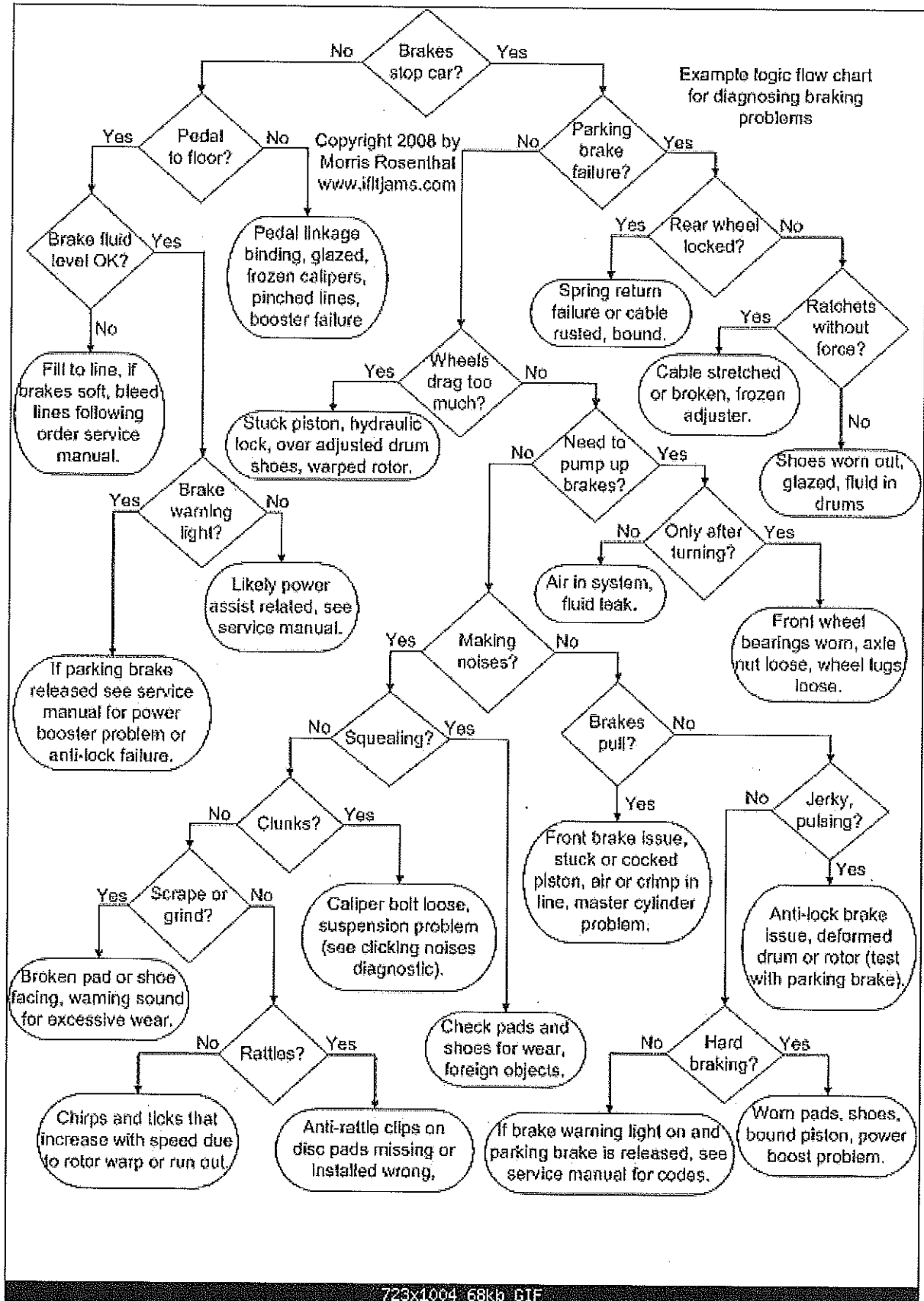
Poka yoke : - make a bridge across the track



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2. Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example

Ans. Yes, it can be implemented for finding faults in vehicle



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3. Explain CLRA.

Ans. CLRA compliance stands for the Contract Labor Regulation and Abolition act. It was passed in 1970 to raise the standard of working conditions and prevent exploitation of employees. The CLRA Act applies to establishments or organizations that employ twenty or more people.

CLRA Act is applicable to every establishment in which 20 or more workmen are employed as contract labor or were so employed anytime during last 12 months. Hence, the Act would be become applicable once 20 or more workmen are employed as contract labor on any day in an establishment during the preceding 12 months.

Procedure for obtaining CLRA License?

1. The contractor has to fill the application for grant of a license in Form No-IV.
2. Put in a request with the Licensing Authority along with the application.
3. Security amount of Rs.
4. Receipt of the fee paid to the licensing officer.

4. Categories the below mentioned items in ABC category using the fundamentals of ABC analysis.

Item no.	101	102	103	104	105	106	107	108	109	110	111	112	113	114
Unit cost	2	4	6	8	10	12	2	4	6	8	10	12	2	4
Annual demand	1000	2000	3000	500	400	300	200	100	100	200	300	400	500	600

Ans.

Item number	Cumulative % of items	Unit cost	Annual demand	Total cost per year	Usage as a % of total usage	Cumulative % of total
107	10%	20	18,000	360,000	48,8%	48,8%
101	20%	5	48,000	240,000	32,5%	81,3%
109	30%	9	5,000	45,000	6,1%	87,4%
105	40%	7	4,800	33,600	4,6%	92%
102	50%	11	2,000	22,000	3,0%	94,9%

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106	60%	16	1,200	19,200	2,6%	97,5%
104	70%	8	800	6,400	0,9%	98,4%
110	80%	12	500	6,000	0,8%	99,2%
103	90%	15	300	4,500	0,6%	99,8%
108	100%	4	300	1,200	0,2%	100%
Total usage				737,900	100%	

Category	Items	Percentage of items	Percentage usage (%)	Action
Class A	107, 101	20%	81,6%	Close control
Class B	109, 105, 102, 106	40%	16,2%	Regular review
Class C	104, 110, 103, 108	40%	2,5%	Infrequent review

Vikram



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skill

Session: 2021-22 (Summer Semester)

B. Voc., 5th Semester

End-Sem Examination

Course Code : AUT1503

Time : 2 Hour

Course Name: Workshop Management

Max. Marks : 50

Instructions:

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

Section – A

10X01 = 05 Marks

1. What does B in ABC stands for: -
 - a. Better.
 - b. Behind.
 - c. Believe.
 - d. None of the Above.
2. Minimum wages act was introduced in: -
 - a. 1950
 - b. Early 90s
 - c. 1948
 - d. 1947
3. Maternity benefits act was introduced in: -
 - a. 1962
 - b. 1961
 - c. 2000
 - d. 1950
4. ESI act introduced in: -
 - a. 1950
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 - d. None of the above.
5. What does A in CLRA stands for: -
 - a. Abolition.
 - b. Abort.
 - c. Asylum.
 - d. None of the Above.
6. Which theory gives zero defect principle -
 - a. Kanban
 - b. Kaizen.
 - c. Poke yoke.
 - d. None of the above.
7. Kanban Concept is related to: -
 - a. JIT
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 - c. JIT and Lean
 - d. None of the above

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8. What factor increases the time of BEP: -
 - a. Loss
 - b. Profit
 - c. BEA
 - d. None of the above.
9. Child labor act introduced in: -
 - a. 1986
 - b. 1987
 - c. 1920
 - d. None of the above.
10. Payment of wages act introduced in: -
 - a. 1962
 - b. 1936
 - c. 2005
 - d. 1940

Section – B

04X04 = 16 Marks

1. Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example
2. How “Seiso” is helpful in for the role of Workshop Manager?
3. How you will implement “zero defect” concept in your job role?
4. What do you mean by ABC analysis? Write three points for the same.

Section – C

04X06 = 24 Marks

1. Explain Poke yoke theory with an example of real life .(in steps)
2. Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example
3. What do you mean by CLRA? Write down the procedure of getting it.
4. Categories the below mentioned items in ABC category using the fundamentals of ABC analysis.

Item number	101	102	103	104	105	106	107	108	109	110
Unit cost	5	11	15	8	7	16	20	4	9	12
Annual demand	48000	2000	300	800	4800	1200	18000	300	5000	500

V. K. Singh

**BHARTIYA SKILL DEVELOPMENT UNIVERSITY****School of Automotive Skill****Session: 2021-22 (Summer Semester)****B. Voc., 5th Semester****End-Sem Examination****Course Code : AUT1503****Time : 2 Hour****Course Name: Workshop Management****Max. Marks : 50****Instructions:**

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 - c. **1948**
 - d. 1947
3. Maternity benefits act was introduced in: -
 - a. 1962
 - b. **1961**
 - c. 2000
 - d. 1950
4. ESI act introduced in: -
 - a. 1950
 - b. 1979.
 - c. **1948.**
 - d. None of the above.
5. What does A in CLRA stands for: -
 - a. Abolition.
 - b. Abort.
 - c. Asylum.
 - d. None of the Above.
6. Which theory gives zero defect principle -
 - a. Kanban
 - b. Kaizen.
 - c. **Poke yoke.**
 - d. None of the above.
7. Kanban Concept is related to: -
 - a. JIT
 - b. Lean
 - c. **JIT and Lean**
 - d. None of the above

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8. What factor increases the time of BEP: -
 - a. Loss
 - b. Profit
 - c. BEA
 - d. None of the above.
9. Child labor act introduced in: -
 - a. 1986
 - b. 1987
 - c. 1920
 - d. None of the above.
10. Payment of wages act introduced in: -
 - a. 1962
 - b. 1936
 - c. 2005
 - d. 1940

Section – B

04X04 = 16 Marks

1. Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example

Ans. This cause analysis tool is considered one of the seven basic quality tools. The fishbone diagram identifies many possible causes for an effect or problem. A fishbone diagram, as the name suggests, mimics a fish skeleton. The underlying problem is placed as the fish's head (facing right) and the causes extend to the left as the bones of the skeleton; the ribs branch off the back and denote major causes, while sub-branches branch off of the causes and denote root causes.

2. How “Seiso” is helpful in for the role of Workshop Manager?

Ans. Seiso is the third step of the 5S method. It means **"to make everything shiny clean"**. It is the only one-time step in the process. The Shine phase creates a **more pleasant environment for employees**, who no longer have to combat dust, dirt and clutter. Cleaning the area every day also leads to a higher level of employee buy-in for the 5S method.

3. How you will implement “zero defect” concept in Your job role?

Ans. Zero defects is a way of thinking and doing that reinforces the notion that defects are not acceptable, and that everyone should "do things right the first time." The idea here is that with a philosophy of zero defects, you can increase profits both by eliminating the cost of failure and increasing revenues through.

you're building products to meet customer specifications, the most distinct advantage of achieving Zero Defects is reduction of waste and cost. The benefits are visible: Zero Defects equates to upfront savings, higher customer satisfaction, improved customer loyalty—and higher sales and profits.

Maintain Customer Satisfaction & Loyalty

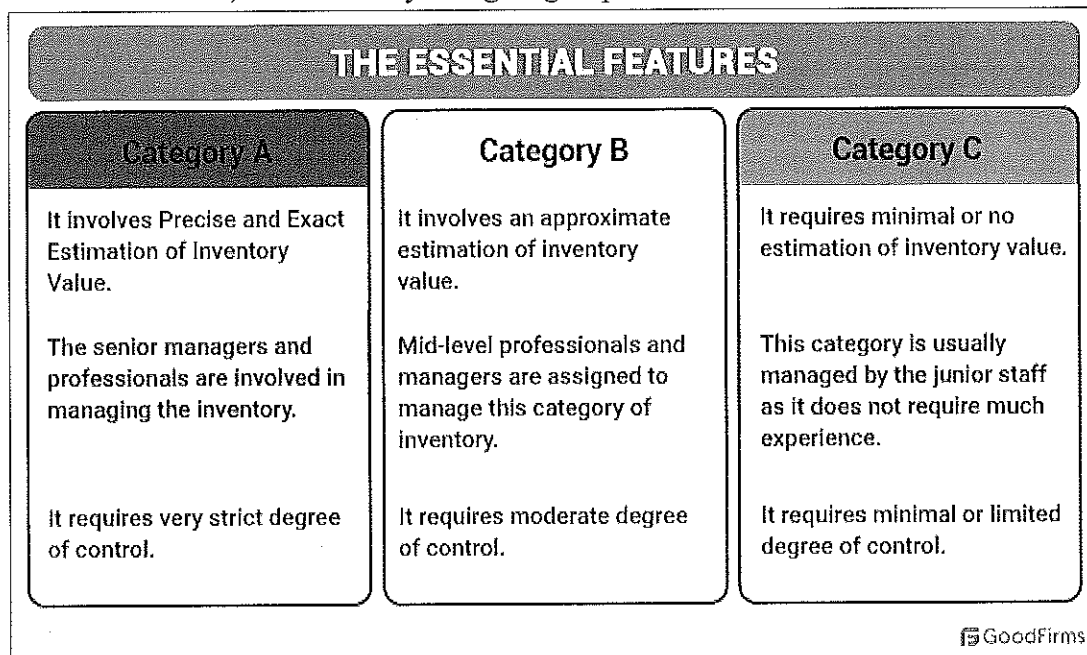
Happy Customers mean more sales!

There is always a cost associated with manufacturing defects.

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4. What do you mean by ABC analysis? Write three points for the same.

Ans. ABC analysis is an inventory management technique that determines the value of inventory items based on their importance to the business. ABC ranks items on demand, cost and risk data, and inventory managers group items into classes based on those criteria.

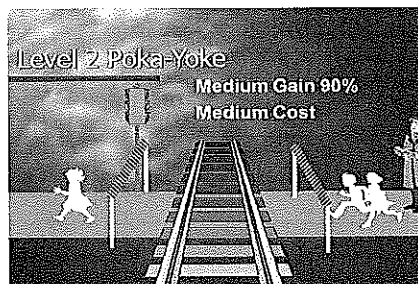
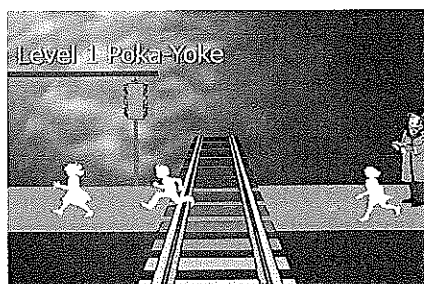


Section – C

04X06 = 24 Marks

1. Explain Poke yoke theory with an example of real life .(in steps)

Ans.



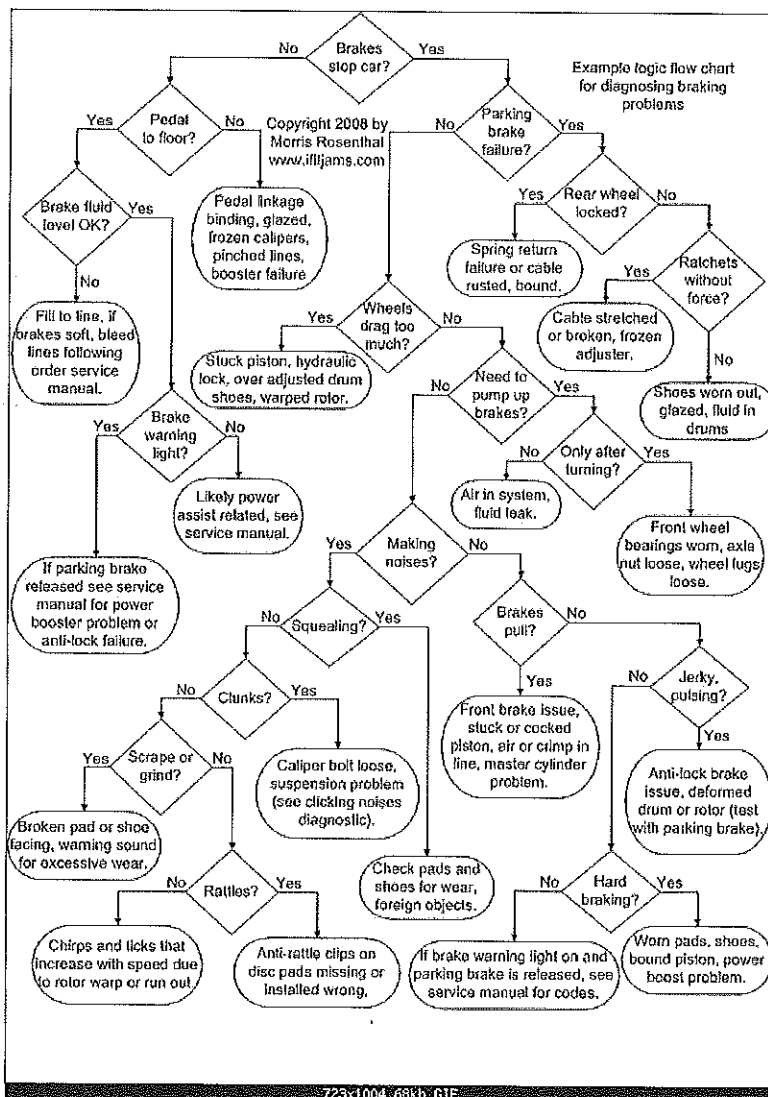
Poka yoke : - make a bridge across the track

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2. Can we implement fish bone analysis in finding faults in vehicle? If yes, Explain with example

Ans. Yes, it can be implemented for finding faults in vehicle



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3. What do you mean by CLRA? Write down the procedure of getting it.

Ans. CLRA compliance stands for the Contract Labor Regulation and Abolition act. It was passed in 1970 to raise the standard of working conditions and prevent exploitation of employees. The CLRA Act applies to establishments or organizations that employ twenty or more people.

CLRA Act is applicable to every establishment in which 20 or more workmen are employed as contract labor or were so employed anytime during last 12 months. Hence, the Act would be become applicable once 20 or more workmen are employed as contract labor on any day in an establishment during the preceding 12 months.

Procedure for obtaining CLRA License?

1. The contractor has to fill the application for grant of a license in Form No-IV.
2. Put in a request with the Licensing Authority along with the application.
3. Security amount of Rs.
4. Receipt of the fee paid to the licensing officer.

4. Categories the below mentioned items in ABC category using the fundamentals of ABC analysis.

Item number	101	102	103	104	105	106	107	108	109	110
Unit cost	5	11	15	8	7	16	20	4	9	12
Annual demand	48000	2000	300	800	4800	1200	18000	300	5000	500

Ans.

Item number	Cumulative % of items	Unit cost	Annual demand	Total cost per year	Usage as a % of total usage	Cumulative % of total
107	10%	20	18,000	360,000	48,8%	48,8%
101	20%	5	48,000	240,000	32,5%	81,3%
109	30%	9	5,000	45,000	6,1%	87,4%
105	40%	7	4,800	33,600	4,6%	92%
102	50%	11	2,000	22,000	3,0%	94,9%

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106	60%	16	1,200	19,200	2,6%	97,5%
104	70%	8	800	6,400	0,9%	98,4%
110	80%	12	500	6,000	0,8%	99,2%
103	90%	15	300	4,500	0,6%	99,8%
108	100%	4	300	1,200	0,2%	100%
Total usage				737,900	100%	

Category	Items	Percentage of items	Percentage usage (%)	Action
Class A	107, 101	20%	81,6%	Close control
Class B	109, 105, 102, 106	40%	16,2%	Regular review
Class C	104, 110, 103, 108	40%	2,5%	Infrequent review

Vipin



School of Automotive Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 5th Semester,
End-Sem. Examination

Course Code: AUT1504

Time: 2 Hours

Course Name: Paint Shop Management

Max. Marks: 50

Instruction:

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

Section – A

10X01 = 10 Marks

Q.1 How many angles are required to inspect a color?

- | | |
|--------|--------------------------|
| a. One | c. Three |
| b. Two | d. None of the mentioned |

Q. 2 Painter A says: Used thinner & paint material should be stored in a separate tank.

Painter B Says: Do not discard used thinner & paint material in the garbage as these are harmful for the environment.

Who is correct??

- | | |
|--------------|--------------------------|
| a. Painter A | c. Both (a) & (b) |
| b. Painter B | d. None of the mentioned |

Q. 3 What is meaning of VOC ?

- | | |
|-------------------------------|---------------------------|
| a. Volatile organic compound | c. Volatile organic class |
| b. Volatile organic complaint | d. None of the mentioned |

Q. 4 Which statement is incorrect related to masking?

- a. Newspaper should be used for masking the Vehicle to be painted.
- b. OPS should use for quick masking.
- c. A Using OPS will save the masking time as compared to brown paper sheet.
- d. Masking prevents vehicle from over spray

Q. 5 Which of the following purposes for applying plastic primer to a bumper if base material is correct?

- a. To fill up the paper sanding marks before finishing.
- b. To improve the scratch-resistance of the bumper.
- c. To improve adhesive property of a top coat paint to the bumper base material.
- d. To provide the top coat paint with flexibility.



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Q. 6 Defect in paint arises due to?

- a. Adverse atmospheric conditions
- b. Wrong selection of hardener and thinner
- c. Mistakes during paint application
- d. All of the above

Q. 7 Sagging is caused due to following reasons?

- a. Less flash - off time between two coats
- b. Low spraying viscosity
- c. Both a & b
- d. None of these

Q. 8 What is the transfer efficiency of HVLP spray gun?

- a. less than 30%
- b. Less than 40%
- c. more than 65%
- d. None of these

Q. 9 What is the another name of double action sander?

- a. Random orbital sander
- b. Single action sander
- c. Flat -bed sander
- d. Belt sander

Q. 10 What is Paint?

- a. Paint is a coloring liquid which forms a solid a layer after drying
- b. It is a type of thinner
- c. It is a chemical used for cleaning
- d. None of these

Section – B

04X04 = 16 Marks

Q-11. Name the different types of holes.

Q-12 Write the factors which effect the transfer efficiency of a spray gun?

Q-13. Write the Parameters involved in cost estimation?

Q-14. What will be the probable causes in Paint booth if the pressure inside the paint booth is too high? Write its remedies?

Section – C

04X06 = 24 Marks

Q-15. Write the process for spot repair using metallic paint.

Q-16. Write the Steps to make a design on a panel.

Q-17. Make a checklist for spray booth maintenance.

Q-18. Explain the working principle of air spray guns?

Vipin



School of Automotive Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 5th Semester,
Answer sheet End-Sem. Examination

Course Code: AUT1504

Time: 2 Hours

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material



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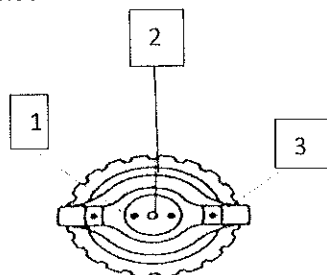
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- b. It is a type of thinner
- c. It is a chemical used for cleaning
- d. None of these

Section – B

04X04 = 16 Marks

Q-11. Name the different types of holes.



Ans:-1. Air atomizing holes

2. Centre air hole



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Q.12 Write the factors which effect the transfer efficiency of a spray gun?

Ans

- Part size
- Part geometry
- Gun-target distance
- Coating viscosity
- Ease with which coating can be atomized
- Spray gun design and method of atomization
- Fluid pressure
- Atomizing air pressure
- Fan size
- Overlapping of successive spray gun strokes
- Orifice diameter of spray gun cap
- Air velocity in the spray booth
- Air balance in the spray booth

Q.13. Write the Parameters involved in cost estimation?

Ans. There are various parameters involved in estimation of cost.

- 1. Correct identification of paint damage.
- 2. Product knowledge which will be used in the repair.
- 3. Prices of the product consumed in the repair.
- 4. Quantity of the product required for the repair.
- 5. Facility charges should also be considered in the estimation.
- 6. Time required for the repair to calculate the labour charges and facility charges.

Q-14. What will be the probable causes in Paint booth if the pressure inside the paint booth is too high? Write its remedies?

Ans There can be various reasons: -

1. Floor filters are choked so they will not allow the air to pass through.
2. Passage of exhaust air is blocked.
3. Exhaust blower is not working.
4. Variation in the speed of both the blowers

Section – C

04X06 = 24 Marks

Q-15. Write the process for spot repair using metallic paint.

Ans:- Carefully clean with Prepsol



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

1. Make sure that the surfacer area is as small as possible.
2. sanding pad using P2000 wet grit paper
3. Blow parts with compressed air, clean with degreaser and wipe with a tack cloth
4. Mix Basecoat as per TDS
5. Apply basecoat:
6. until surfacer (damaged) area is fully covered by overlapping each coat slightly so a "dust zone" remains.
7. Prepare midcoat:-

67% Binder XB165 and 33% thinner XB387

- 9 Prepare Blend in:-

Mix 50% Basecoat with 50% Midcoat and reduce pressure during fade out so a smooth transition is achieved

8. Mix clear coat as per TDS
9. Apply 2.5 coats extending basecoat area
10. Blend in:

Mix 50% Clearcoat with 50% Blending thinner and reduce pressure during fade out so a smooth transition is achieved.

11. Apply Blending thinner on over spray area.
12. If repair area is in middle or bigger than A4 size, apply Clear Coat on full panel
13. After drying polish the blend-in areas.

Q-16. Write the Steps to make a design on a panel.

Ans.

1. Clean the panel.
2. Scuff the panel
3. Primer application
4. Sanding of primer
5. Sketch the design on the panel with the help of pencil.
6. Mask the design with the help of fine line masking tape.
7. Before basecoat check the masking properly.
8. Apply basecoat.
9. Remove the masking carefully after proper drying.
10. Mask the painted design properly with the help of masking tapes and papers.
- 11 Apply different basecoat on the panel.
12. After proper drying of basecoat remove the masking.
13. Check the edges and sand carefully with P-500 carefully.
14. Apply the clear coat on the panel.



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Q-17. Make a checklist for spray booth maintenance.

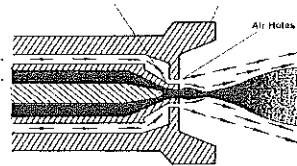
Ans The checkup points for maintenance.

1. Power supply
2. Manometer
3. Cleaning of inside paint booth walls.
4. Filter replacement
 - a. Pre filter
 - b. ceiling filter
 - c. floor filter
5. cleaning of dryer units.
- 6 Lubrication
7. Cleaning of blowers.

Q-18. Explain the working principle of air spray guns?

Ans:-The principle of spray-painting is the same as that of an atomizer. When compressed air is discharged from the air holes in the air cap, a negative pressure is created at the fluid tip, which in turn, applies suction to the paint in the cup.

This suctioned paint is then sprayed as atomized paint, due to compressed air at the holes in the air cap



Vipin



School of Automotive Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 5th Semester
End-Sem. Examination

Course Code: AUT1504

Time: 2 Hours

Course Name: Paint Shop Management

Max. Marks: 50

Instruction:

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2. Answer all questions from section B, each question carries four mark.
3. Answer all questions from section C, each question carries six mark.

Section – A

10X01 = 10 Marks

Q-1. Hue shows the main color.

- a. True
- b. False

Q-2. What are the three things we need during color matching?

- a. Sunlight, Object, Eye
- b. Paint, hardener, clear
- c. Plastic primer, Flexible additive, thinner
- d. None of the mentioned

Q-3. Which instrument is used for measuring intensity of light?

- a. lux meter
- b. lux voltmeter
- c. Intensity meter
- d. Both a & b

Q-4. Painter A says, mixing room must have flash proof lights.
Painter B Says, flash proof light is not mandatory for paint mixing room.
Who is correct?

- a. Painter A
- b. Painter B
- c. Both (a) & (b)
- d. None of the mentioned

Q-5. Secondary colors are the combinations of any two primary colors:

- a. True
- b. False



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Q-6. How to create orange color?

- a. Red- Blue
- b. Red- yellow
- c. Green- Red
- d. None of these

Q-7. What is chroma lusion?

- a. The colors in which we see many colors.
- b. The colors we get after the mixing of two secondary colors
- c. Both a & b
- d. None of these

Q-8. What is human visible range to see a color?

- a. 400-700 Nm
- b. 200-300 Nm
- c. 1000-1500 Nm
- d. None of these

Q-9. Volatile Organic Compounds are found in:

- a. Paint
- b. Thinner
- c. Catalyst and hardener
- d. All of the above

Q-10. If you find pin holes in the paint film then what should the possible cause:

- a. Improper cleaning of panel/ vehicle before painting
- b. Due to the moisture and oil in the compressed air
- c. Due to the non-specified flash off time
- d. All of these

Section – B

04X04 = 16 Marks

Q-11. What is transfer efficiency? How it can be calculated?

Q-12. What will be the probable causes in Paint booth if the pressure inside the paint booth is too low? Write its remedies.

Q-13. Discuss about the paint mixing room .

Q-14. Brief about paint (shade) matching processes.

Section – C

04X06 = 24 Marks

Q-15. What is the role of damper in the paint booth? What will happen if the damper does not function properly?

Q-16. Write the process of standard repair (inside outside) using solid color.

Q-17. Draw and explain Hue circle diagram.

Q-18. Write the process for spot repair using solid paint.

Vijay



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Section – A

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- a. True
- b. False

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- a. True
- b. False



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

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- d. All of the above**

Q. 10 If you find pin holes in the paint film then what should the possible cause.

- a. Improper cleaning of panel/ vehicle before painting
- b. Due to the moisture and oil in the compressed air
- c. Due to the non-specified flash off time
- d. All of these**

Section -- B

04X04 = 16 Marks

Q.11 What is transfer efficiency? How it can be calculated?

Ans:- It is defined as the ration of weight of solid coating deposited on the metal and the weight of solid coating provided for the application.

Weight of solid coating (gm):-

Weight of liquid x Weight of solids %

100



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Q.12 What will be the probable causes in Paint booth if the pressure inside the paint booth is too Low? Write its remedies.

Ans There can be various reasons: -

1. Sealing filters are choked so they will not allow the air to pass through.
2. Passage of exhaust air is increases
3. Inlet blower is not working.

Q-13. Discuss about the paint mixing room .

Ans:- The paint mixing room is a place where we do the mixing of paints and we store the products and tools which we used in the painting.

Generally we have two exhaust fans in paint mixing room, one is upside and other one downside.

Q-14. Brief about paint (shade) matching processes.

Section – C

04X06 = 24 Marks

Q. 15 What is the role of damper in the paint booth? What will happen if the damper does not function properly?

Ans The role of damper is to circulate the air in the paint booth.

a) during painting mode: -

When we turn on the painting mode, booth the damper stays in its original position which is closed and simply exhaust the air which comes from the inlet air.

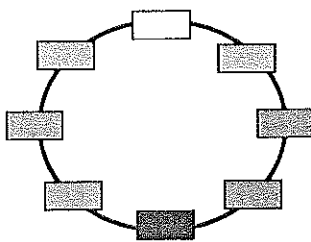
b) During baking mode: -

In the baking mode we turn off the exhaust blower and the damper also opens and it helps to recirculate the air to enhance the baking process.

Q-16. Write the process of standard repair (inside outside) using solid color.

Q-17. Draw and explain Hue circle diagram.

Ans



White, black and gray are "neutral" colors. They have no hue. Neutral colors are not more related to one hue than to anyother. To show this on the hue circle diagram, we place neutral colors at the center

Q-18. Write the process for spot repair using solid paint.



BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Ans:- Carefully clean with Prepsol

1. Make sure that the surfacer area is as small as possible.
2. sanding pad using P2000 wet grit paper
3. Blow parts with compressed air, clean with degreaser and wipe with a tack cloth
4. Mix Basecoat as per TDS
5. Apply basecoat:
6. until surfacer (damaged) area is fully covered by overlapping each coat slightly so a "dust zone" remains.
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Vipin