BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

2nd In-Sem. Examination

Course Code: AUT1501 **Time: 1 Hour**

Course Name: Automotive Mechatronics System **Max. Marks: 20**

Instruction:

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

Section-A **05x01=05Marks**

Q1) Which of the following is/are characteristics of mechatronic products and systems?

a. Functional interaction between mechanical, electronic and information technologies.
b. Special interaction of subsystems in one physical unit.
c. Intelligence related to the control functions of the mechatronics system.
d. All of the above.

Q2) In which system does the output not affect the process in any way?

a. Open loop system.
b. Closed loop system.
c. Both a and b.
d. None of the above.

Q3) The sensors are classified on the basis of.....?

a. Functions.
b. Performance.
c. Output.
d. All of the above.

Q4) A piezo-electrical crystal generates voltage when subjected to ____ force.

a. Electrical.
b. Mechanical.
c. Gravity.
d. All of the above.

Q5) Following type of sensors are used to generate information in object grasping and obstacle avoidance.

a. Hall Effect sensor.
b. Proximity sensor.
c. Light sensor.
d. Optical sensors.

Section-B 03X02 = 06 Marks

Q6) Define Mechatronic system, and explain the benefits of mechatronic system.

Q7) What is Negative temperature coefficient and Positive temperature coefficient?

Q8) Define sensors and actuators with examples.

Section-C 03X03 = 09 Marks

Q9) Explain the procedure for fault diagnose step by step, also explain fault memory and actual values in Diagnostic tool.

Q10) Explain the coolant temperature sensor with construction and principle.

Q11) Explain Micromechanical pressure sensor with construction and applications.

Answerkey

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills
Session: 2021-22 (Summer Semester)
B. Voc. Program, 5th Semester,
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Course Code: AUT1501 **Time: 1 Hour**
Course Name: Automotive Mechatronics System **Max. Marks: 20**

Section-A **05x01=05Marks**

Q1) Which of the following is/are characteristics of mechatronic products and systems?
Answer- d. All of the above

Q2) In which system does the output not affect the process in any way?
Answer- a. open loop System

Q3) The sensors are classified on the basis of.....
Answer- d. All of the above

Q4) A piezo-electrical crystal generates voltage when subjected to _____ force.
Answer- d. All of the above.

Q5) Following type of sensors are used to generate information in object grasping and obstacle avoidance.
Answer- b. Proximity sensor

Section-B **03X02 = 06 Marks**

Q6) Define Mechatronic system, and explain the benefits of mechatronic system.

Definition-

-Mechatronics is integration of mechanical engineering, electronics engineering, control engineering and computer science.

-Mechatronics engineering is the design of computer controlled electro mechanical systems.

-A mechatronic system is a computer controlled mechanical system.

*Any 3 Marks and benefits any 2-3 3 Marks

-Enhanced features and functionality

-More user friendly

-Precision control

-More efficient

-Flexible design- reprogrammable

-More reliable

-Safer

Q7) 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.

Q8) define sensors and actuators with examples.

Ans-A sensor is a device that detects and responds to some type of input from the physical environment.

-An actuator is a part of a device or machine that helps it to achieve physical movements by converting energy, often electrical, air, or hydraulic, into mechanical force. it is the component in any machine that enables movement.

Section-C **03X03 = 09 Marks**

Q9) Explain the procedure for fault diagnose step by step, also explain fault memory and actual values in Diagnostic tool.

Ans- Procedure- Identification of malfunction indication in instrument cluster

-analysing physical damage to identified components

-connection of diagnostic tool for the identification of fault codes.

-check for fuses relays and wire cuts.

Fault memory means information of malfunctions stored in the on-board ECU.

actual values are nothing but real-time data being received from actuators and sensors.

Q10) explain coolant temperature sensor with construction and principle.

Ans- coolant temperature sensor is used to measure the temperature of the coolant in the cooling system, giving an indication of how much heat the engine is giving off.

Consist of thermistor and Works on NTC principle as the temperature increases resistance decreases The normal value of the sensor voltage is 2V at cold engine and 0.5V at warm engine

diagram-

Q11) Explain Micromechanical pressure sensor with construction and applications.

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

Applications-

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

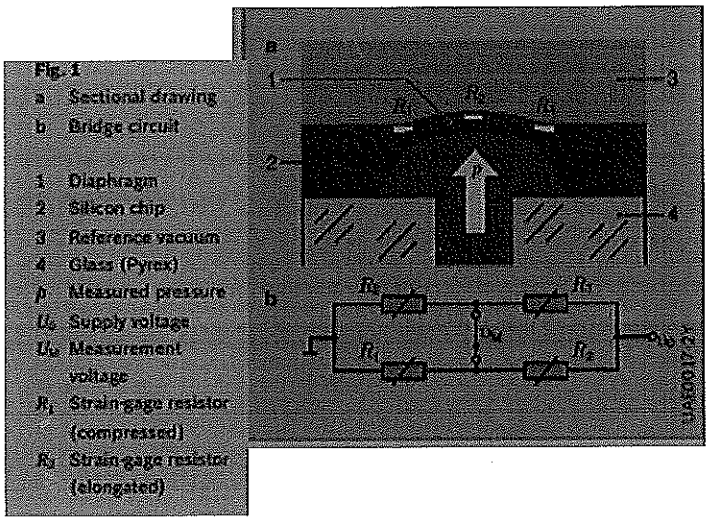
-Boost pressure for boost-pressure control

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

-Oil pressure to take engine load

-Fuel pressure for monitoring

construction-



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Q.P.

Registration No.: .....

School of Automotive Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

2st In-Sem. Examination

Course Code: AUT1502 **Time: 1 Hour**

Course Name: Automotive Electrical System **Max. Marks: 20**

Instruction:

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

Section – A

05X01 = 05 Marks

Q1. The starter motor is not turning, only sounding "claclac". Suggestions?

A. Check fuel tank.
B. Sure, it's a blown fuse!
C. Starter relay not working.
D. Check battery and connections.

Q2. Current for a starter motor is about...

A. 350A
B. 1.75A
C. 240V
D. 60Ah

Q3. MOST means...

A. More Options Speed Transport
B. Multiple Orders Safely Transformed
C. Media Oriented Systems Transport
D. 12 Volts

Q4. What belongs to the MOST?

A. Catalytic converter, Audio
B. OBD, ABS
C. Internet, Media, Graphics
D. The starter

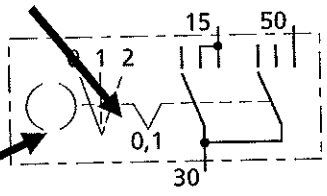
Q5. What is Ethernet?

A. Wired computer networking
B. Wlan
C. Payment by cryptocurrency
D. A platform for criminals

Section – B

03X02 = 06 Marks

Q6. What do the lower numbers 0,1 mean?



Q7. What does the broken circle mean?

Q8. What is the meaning of 50?

Section – C

03X03 = 09 Marks

Q9. Explain how to avoid electromagnetic compatibility.

Q10. Name three substances that can be found in a car starter battery.

Q11. Give three examples of smart charging.

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Answer Key
AUT/502

Section – A

05X01 = 05 Marks

Q1. The starter motor is not turning, only sounding "claclac". Suggestions?

A. Check fuel tank.

B. Sure, it's a blown fuse!

C. Starter relay not working.

D. Check battery and connections.

Q2. Current for a starter motor is about…

A. **350A**

B. 1.75A

C. 240V

D. 60Ah

Q3. MOST means…

A. More Options Speed Transport

B. Multiple Orders Safely Transformed

C. **Media Oriented Systems Transport**

D. 12 Volts

Q4. What belongs to the MOST?

A. Catalytic converter, Audio

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C. **Internet, Media, Graphics**

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Q5. What is Ethernet?

A. **Wired computer networking**

B. Wlan

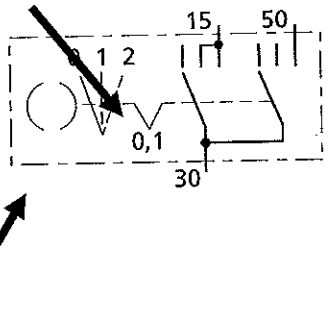
C. Payment by cryptocurrency

D. A platform for criminal

Section – B

03X02 = 06 Marks

Q6. What do the lower numbers 0,1 mean?



The switch is only fixed in position 0 and 1.

For position 2 we have to engage by hand.

Q7. What does the broken circle mean?

Key operated, visualization of key inserting.

Q8. What is the meaning of 50?

Starter, crank engine, usually only operated for 2 seconds..

Section – C

03X03 = 09 Marks

Q9. Explain how to enable electromagnetic compatibility.

Twist the cable.
Sheathing with ground.
As little electricity as possible.

Q10. Name three substances that can be found in a car battery.

lead
plastic (polypropylene)
acid (sulfuric acid)

Q11. Give three examples of smart battery charging.

- **An artificial intelligence increases the charge when the car is rolling downhills without load on the engine.**
- **Or interrupts the charging of the battery while overtaking to provide maximum power to the combustion engine.**
- **Adaptive eV charging, depending on the grid's voltage: Increase the charging current when the sun is shining.**

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skill

Session: 2021-22 (Summer Semester)

B. Voc., 5th Semester

2nd In-Sem Examination

Course Code : AUT1503 **Time : 1 Hour**

Course Name: Workshop Management **Max. Marks : 20**

Instructions:

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

Section – A

05X01 = 05 Marks

1. Which theory gives zero defect principle?
   a. Kanban
   b. Kaizen.
   c. Poke yoke.
   d. None of the above.

2. ABC analysis deals with:
   a. Analysis of process chart.
   b. Flow of material.
   c. Ordering schedule of job.
   d. Controlling Inventory cost.

3. At Break Even Point following is supposed to happen:
   a. Profit
   b. Loss
   c. No Profit No Loss
   d. Profit = Loss

4. Which category provides the maximum profit to business?
   a. "A".
   b. "B".
   c. "C".
   d. All of the above.

5. What does "Baka" means:
   a. Poka
   b. Fool
   c. Full
   d. Approach .

Section – B

03X02 = 06 Marks

1. Why we use fish bone analysis for searching root of the problem?
2. How "Seiri" is helpful in fish bone analysis?
3. Why is "zero defect" an important concept?

Section – C

03X03 = 09 Marks

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

Registration No.: ..... Answer Key

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skill

Session: 2021-22 (Summer Semester)

B. Voc., 5th Semester

2nd In-Sem Examination

Course Code : AUT1503 **Time : 1 Hour**

Course Name: Workshop Management **Max. Marks : 20**

Instructions:

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

Section – A

05X01 = 05 Marks

1. Which theory gives zero defect principle -

   a. Kanban
   b. Kaizen.
   c. Poke yoke.
   d. None of the above.

2. ABC analysis deals with

   a. Analysis of process chart.
   b. Flow of material.
   c. Ordering schedule of job.
   d. Controlling Inventory cost.

3. At Break Even Point following is supposed to happen

   a. Profit
   b. Loss
   c. No Profit No Loss
   d. Profit = Loss

4. Which category provides the maximum profit to business?

   a. "A".
   b. "B".
   c. "C".
   d. All of the above.

5. What does "Baka" means:

   a. Poka
   b. Fool
   c. Full
   d. Approach .

Registration No.: .....

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Section – B

03X02 = 06 Marks

1. Why we use fish bone analysis for searching root of the problem?

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 "Seiri" is helpful in fish bone analysis?

Ans. There are four steps to using the tool.

1. Identify the problem.
2. Work out the major factors involved.
3. Identify possible causes.
4. Analyze your diagram.

3. Why is "zero defect" an important concept?

Ans. Maintain Customer Satisfaction & Loyalty

- Happy Customers mean more sales!

COSTS

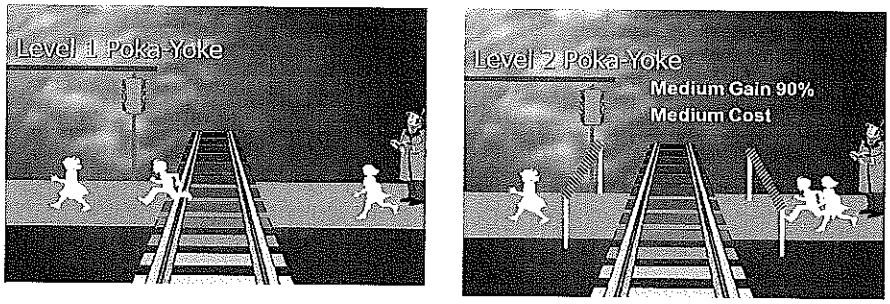
- There is always a cost associated with manufacturing defects!

Section – C

03X03 = 09 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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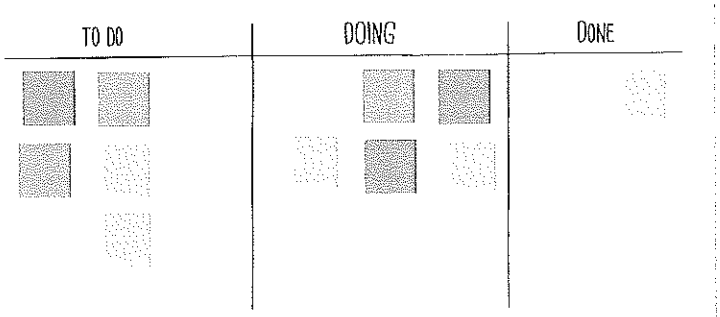
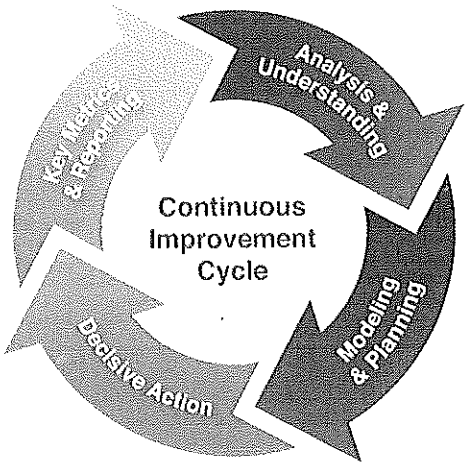
2. Explain Kanban theory with an example of real life.

Ans.



3. Explain kaizen theory with an example of real life.

Ans.



Vipin

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Registration No.: .....

School of Automotive Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

2nd In-Sem. Examination

Course Code: AUT1504 **Time: 1 Hour**

Course Name: Paint Shop Management **Max. Marks: 20**

Instruction: Attempt all Questions.

Section – A

05X01 = 05 Marks

Q-1. Which type of special cleaner we used during plastic painting?

a. Anti-static cleaner
c. Prepsol
b. Degreaser
d. None of these

Q-2. Which of the following variables does not affect the drying time of coating?

a. Air flow and movement
c. Type of substrate
b. Surface temperature
d. Solvent selection

Q-3. The best light for color matching is.....

a. Natural day light
c. Sodium light
b. Fluorescent light
d. None of the above

Q-4. Which chemical is found in Hardener?

a. Isocyanate
c. Xylene
b. Butane
d. None of the above

Q-5. Which type of paint is formulated using 1k binder?

a. Solid Paint
c. Pearl Paint
b. Metallic paint
d. Both (b) and (c)

Section – B

03X02 = 06 Marks

Q-6. Write the steps for plastic painting of a new panel.

Q-7. What is the difference between H.S tinter and L.S. tinter?

Q-8. Write the steps for color matching?

Section – C

03X03 = 09 Marks

Q-9. Explain different types of borders used in masking.

Q-10.Discuss about the paint mixing room .

Q-11. Write the process of spot repair using solid color.

Answer Key

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Registration No.: .....

School of Automotive Skills

Session: 2021-22 (Summer Semester)

B. Voc. Program, 5th Semester,

2nd In-Sem. Examination

Course Code: AUT1504 **Time: 1 Hour**

Course Name: Paint Shop Management **Max. Marks: 20**

Instruction: Attempt all Questions.

Section – A

05X01 = 05 Marks

Q-1. Which type of special cleaner we used during plastic painting?

a. Anti-static cleaner
c. Prepsol
b. Degreaser
d. None of these

Ans (a)

Q-2. Which of the following variables does not affect the drying time of coating?

a. Air flow and movement
c. Type of substrate
b. Surface temperature
d. Solvent selection

Q-3. The best light for color matching is.....

a. Natural day light
c. Sodium light
b. Fluorescent light
d. None of the above

Q-4. Which chemical is found in Hardener?

a. Isocyanate
c. Xylene
b. Butane
d. None of the above

Q-5. Which type of paint is formulated using 1k binder?

a. Solid Paint
c. Pearl Paint
b. Metallic Paint
d. Both(b) and (c)

Section – B

03X02 = 06 Marks

Q-6. Write the steps for plastic painting of a new panel.

Ans:-

- Heat plastic parts for
  60 minutes at +60°C object temperature
- Carefully clean with antistatic cleaner
- Heat plastic parts for
  30 - 40 minutes at +60°C
  object temperature
- Lightly clean parts once more with antistatic cleaner
- Apply 1.5 coats of plastic primer / sealer
- Flash off time 5-10 mins
- Putty
- (for minor damages)
- Mix putty according to TDS and apply
- Drying:
- Air dry- 20-30 minutes at 20°C
- IR – 3 minutes short
- Sanding:
- first sanding
- second sanding
- Primer surfacer
- Blow parts with compressed air, lightly clean once more and wipe with a tack cloth
- mix the primer surfacer
- apply 1 tack coat followed by a normal full coat.
  Clean with degreaser and wipe with a tack cloth; blow part with compressed air (not with wet-on-wet application

- mix the base coat
- apply

a) 2.5 coats for metallic/two stage pearl colors = 15 - 20µm

b) 2.5 coats of under coat followed by 1.5-2 coats of basecoat for three-stage pearl colors = 40 - 45µm

- intermediate flash-off time: 5 - 10 minutes
- flash-off time before clear coat: 15 - 20 min.
- mix clear coat
- apply 1.5 coats of glossy / semiglossy / matt clear coat as per the need

Flash-off

- Oven Bake: according to TDS
- IR Drying: according to TDS

Q-7. What is the difference between H.S tinter and L.S. tinter?

Ans The H.S. Stands for high strength and the pigmentation of the H.S. is very high and we generally used these tinters in the solid paints.

The L.S. Stands for Low strength tinters and the pifmentation of L.S. is very low and generally used for metallic and pearl paints

Q-8. Write the steps for color matching?

Ans:- 1. Inspect the damage.

2. Find the shade card of the color in natural day light.
3. Formulate the color.
4. Apply on flexible panels.
5. Match the panel with vehicle color.
6. If color does not match do the tinting or shading of the color.
7. Repeat the process until color does not match.

Section – C

03X03 = 09 Marks

Q-9. Explain different types of borders used in masking.

- AnsThe area that separates the painted area from non-painted area is called a Border.
- It is important to select the border on the extent of repair and condition of old paint.

Borders for masking :-

1. Borders over gaps between panels.
2. Borders over body sealers.
3. Borders over crests of character lines.
4. Borders on the flat portion of panel

Q-10.Discuss about the paint mixing room .

Ans The value of adding a mixing room where you store all of your paints and solvents is that it keeps the highly flammable liquids used in spray painting properly ventilated and away from the high temps inside of your paint booth.

Regulations limit how many gallons of flammable liquids can be kept inside of your mixing room. The NFPA (National Fire Protection Association) sets most standards for safety regarding paint mixing room configurations.

For instance, if your mixing room is within six feet of your paint booth, you can only store up to 120 gallons of flammable liquids. The maximum any shop can store in their mixing room is 360 gallons. Some of the other codes required for shops utilizing spraying facilities include:

- Limiting the size of your mixing room to 150 square feet
- Ensuring the ability to contain chemical spills within the mixing room
- Maintaining proper ventilation at all times based on the size of the mixing room and exhaust systems
- Classifying electrical zones outside of the mixing room (the same as those for the actual spray booth)
- Installing fire prevention mechanisms like sprinkler systems and fire extinguishers in and around the mixing room

A little known fact about paint booth operations is that the hazardous chemicals used are the number one cause of occupational asthma in the U.S. Mixing rooms use exhaust fans to expel noxious fumes, creating a safer environment for your workers.

Like people who worked in construction decades ago who were poisoned by asbestos which caused lung cancer, too much exposure to Isocyanates contained in paints leads to asthma and other health risks. Surprisingly, the biggest danger of this kind of exposure to workers is not inside of the paint booth but in your mixing room.

Q-11. Write the process of spot repair using solid color.

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.
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

After drying polish the blend-in areas.