BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

Session: 2021-22 (Winter 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) Catalytic converters are chambers mounted in the flow system through which the exhaust gas passes?

a. True
b. False
c. Incomplete information
d. None of the Above

Q2) 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

Q3) What is the function of an Anti-lock braking system?

a. Used for car parking
b. To maintain tractive force
c. Programming the system
d. To drive the car

Q4) The main function of Actuator is?

a. To produce motion
b. Detect input
c. Detect output
d. Detect the state of the system

Q5) Catalytic converters are called three-way converters because they are used to reduce the concentration of CO. HC, and NOx in the exhaust.

a. True
b. False
c. Incomplete information
d. None of the Above

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

Q6) explain Modules of mechatronic system.
Q7) what are the benefits of piezo injectors?
Q8) explain electronic stability program.

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

Q9) Explain wheel speed sensor.
Q10) Explain types and working of Catalytic converter.
Q11) Explain the working of Oxygen sensor.

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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) Catalytic converters are chambers mounted in the flow system through which the exhaust gas passes?

a. True
b. False
c. Incomplete information
d. None of the Above

Ans- a

Q2) 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

Ans- d

Q3) What is the function of an Anti-lock braking system?

a. Used for car parking
b. To maintain tractive force
c. Programming the system
d. To drive the car

Ans- b

Q4) The main function of Actuator is?

a. To produce motion
b. Detect input
c. Detect output
d. Detect the state of the system

Ans- a

Q5) Catalytic converters are called three-way converters because they are used to reduce the concentration of CO. HC, and NOx in the exhaust.

a. True
b. False
c. Incomplete information
d. None of the Above

Ans- a

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

Q6) explain Modules of mechatronic system.

Ans- 1. Sensing
I. Sensors
II. Signal Conditioning
III. Analog-to-Digital and Digital-to-Analog Conversion

2. Control
I. Open Loop and Closed Loop Control

3. Action
I. Actuators
II. Motors

Q7) what are the benefits of piezo injectors?

Ans- The greatest advantage of Piezo injectors is the rate and precision in which fuel can be delivered, since the actuator can be rapidly activated and deactivated. Piezo injectors are also known for their superior reliability. The result is increased longevity, durability, efficiency, and reduced emissions.

Q8) explain electronic stability program.

Ans- 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.

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

Q9) Explain wheel speed sensor.

Ans - •Wheel speed sensors and how we test them have been changing. Currently, two types of wheel speed sensors are in use: magnetic inductive (passive) and magneto resistive (active).

•Passive sensors have been around since the early days of the anti-lock brake system (ABS). These are the sensors that function on the generator principle.

•The sensors work with the toothed tone wheels to monitor and provide the anti-lock brake module (ABM) with wheel speed information. The actuator is a toothed tone wheel that rotates with the individual wheel. Each tooth on the tone wheel acts as an actuator for the wheel speed sensor. As the tone wheel rotates, the teeth go in and out of the proximity of the sensor.

Q10) Explain types and working of Catalytic converter.

Ans - A catalytic converter uses a chamber called a catalyst to change the harmful compounds from an engine's emissions into safe gases, like steam. It works to split up the unsafe molecules in the gases that a car produces before they get released into the air.

Reduction catalysts: Help reduce nitrogen oxide pollution by removing oxygen. Nitrogen oxides are broken up into nitrogen and oxygen gases, which on their own are harmless.

Oxidation catalysts: Used to change carbon monoxide into carbon dioxide through an opposite process of adding oxygen.

Q11) Explain the working of Oxygen sensor.

Ans- Oxygen is very important for an engine. It determines the proper engine performance. So, to achieve the correct air-fuel ratio manufactures employ oxygen sensors in the exhaust systems. Besides, the exhaust gas oxygen sensor is also known as the lambda sensor, It is located before the catalytic converter in the exhaust pipe. The sensor generates a voltage with regards to the amount of oxygen in the exhaust gas. Thus, it provides real-time feedback on the mixture composition to the engine management system.

Furthermore, the engine management system (EMS) is calibrated. It provides optimal engine power, emissions and economy over the entire engine operating range. The oxygen sensor helps the EMS to monitor the optimal emission in the exhaust system. Thus, it achieves the ideal air-fuel ratio of 14.7:1.

Q.P.

BHARTIYA SKILL DEVELOPMENT UNIVERSITY

Registration No.: .....

School of Automotive Skills

Session: 2021-22 (Winter Semester)

B. Voc. Program, 5th Semester,

2nd 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. Full form of SMSC in terms of MOST register trademark is.....

A. Short Message Service Centre.
B. Standard Microprocessor Chip.
C. Standard Microsystems Corporation.
D. None of the above.

Q2. Which of the MOST Bus system is more powerful in terms of networking?

A. MOST 25.
B. MOST 50.
C. MOST 150.
D. All of the above.

Q3. What is the full form of CAN BUS system?

A. Controller air network.
B. Controller area network.
C. Computer area network.
D. Controlled area network.

Q4. Which part of Li-ion cell is act as a barrier for ionic transport?

A. Electrode.
B. Electrolyte Reservoir.
C. Seperator.
D. All of the above.

Q5. A Bosch Test Bench is used to test.....

A. Alternator.
B. Starter Motor.
C. Both Alternator & Starter Motor.
D. Battery SOH (State of Health).

Section – B

03X02 = 06 Marks

Q6. What do you understand by Automotive Ethernet?

Q7. What is smart charging & how it can benefit your automotive battery?

Q8. What are most common starter solenoid problems and bad symptoms in an automotive vehicle?

Section – C

03X03 = 09 Marks

Q9. What do you understand by Advanced Charging System Technology? Write down the different levels of charging with their advantages and disadvantages.

Q10. Explain the general electrical troubleshooting procedure in an automotive vehicle.

Q11. Explain Vehicle's Electrical Starting System equipped with the ESB (Emergency Starting Battery) with an appropriate circuit diagram.

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Answer Key

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

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

Section – A

05X01 = 05 Marks

Q1. Full form of SMSC in terms of MOST register trademark is……

Ans. C. Standard Microsystems Corporation.

Q2. Which of the MOST Bus system is more powerful in terms of networking?

Ans. C. MOST 150.

Q3. What is the full form of CAN Bus system?

Ans. B. Controller Area Network.

Q4. Which part of Li-ion cell is act as a barrier for ionic transport?

Ans. C. Seperator.

Q5. A Bosch Test Bench is used to test……

Ans. C. Both Alternator & Starter Motor.

Section – B

03X02 = 06 Marks

Q6. What do you understand by Automotive Ethernet?

Answer:

The Ethernet used in automotive vehicles such as cars is known as **Automotive Ethernet**. It is a physical network which is used to connect various components within a car using wired network. This Ethernet type has following features:

- Should support High Data Rate without EMI/EMC problem.
- Should meet latency, synchronization and bandwidth requirements.
- Power should be delivered over Ethernet cables.
- Should support distributed network architecture for communication.
- Should work with TCP/IP based protocols.

Q7. What is smart charging & how it can benefit your automotive battery?

Answer: Smart charging means adapting the charging cycle of EVs to both the conditions of the power system and the needs of vehicle users. This facilitates the integration of EVs while meeting mobility needs. Smart charging for electric vehicles (EVs) holds the key to unleash

synergies between clean transport sector and low-carbon electricity. It minimizes the load impact from EVs and unlocks the flexibility to use more solar and wind power.

- Benefits:
    - Reduce grid infrastructure investments.
    - Network congestion management.
    - Peak shaving.
    - Provision of ancillary service.

Q8. What are most common starter solenoid problems and bad symptoms in an automotive vehicle?

Answer:

Suggestion 01: Bad Wiring

Poor and hurried wiring lead to either inadequate current supply to the starter solenoid or a more dangerous problem of shorting. Both can make a starter solenoid to malfunction and cause starter system problems. Bad wiring instances include terminals that are left loose or connected the wrong way.

Suggestion 02: Excessive Heating

It happens when extremely high currents flow to or through the solenoid, and for too long.

It can be caused by instances where the ignition switch is left in the 'start' position for long.

The soldering in the contacts melts, and they weld together.

When that happens, the starter solenoid becomes damaged because you can no longer control its switching function.

Suggestion 03: Excessive Moisture

If moisture is left to get inside the starter solenoid, it leads to corrosion of the electrical contacts.

The result is reduced conductivity of the contact surfaces.

The efficiency the starter solenoid becomes greatly reduced, and you experience occasional starter fails.

You may hear the starter click and then stop almost immediately when the current proves too low for the whole operation to finish.

Suggestion 04: Too Much Tightening of Bolts and Other Fasteners

It's usually very easy to over tighten bolts without being aware of it.

It happens especially if you're using tightening tools with a high torque, which causes some parts inside and outside of the starter solenoid to break or bend.

It can lead to shorting or mechanical failure of the affected parts.

The starter solenoid is just one of the components of a starter system.

While a problem with starting the engine may be as a result of it being damaged, it's not always the case, and learning how to diagnose a faulty one is important.

So, how do you tell that it's your car's starter solenoid that's bad? Here are indicators to help you in ascertaining that.

Symptoms of a Bad Starter Solenoid

1. A series of rapid or successive clicks coming from the starter solenoid.
2. The starter continues to rotate even after the drive gear disengages and start button has been released from the 'on' position.
3. The starter solenoid makes a clicking sound and moves a little, but the starter does not rotate.
4. The starter continues to rotate after the start button has been released, but the drive-gear doesn't reverse

Section – C

03X03 = 09 Marks

Q9. What do you understand by Advanced Charging System Technology? Write down the different levels of charging with their advantages and disadvantages.

Answer:

The BMW Advanced Charging system is a **1.25 Amp battery charger** and comes with complex BTP microchip technology. This technology tops off your BMW's lead acid battery charge. Then automatically maintains the battery through "float" voltage which eliminates sulfation which can destroy lead acid batteries.

Advanced Charging System Technologies for EV:

- V2G (Vehicle to Grid) Charging System.
- Wireless EV Charging System.
- Mobile Charging System.
- Ultra-Fast Charging System.
- New Battery Technology.

Level 01 Charging:

- Level 1 charging uses the same 120-volt current found in standard household outlets and can be performed using the power cord and equipment that most EVs come with. Making this type of charging available on your business property is as simple as installing dedicated 120 volt outlets in your company parking lot.

Advantages

- No installation cost if you already have an outlet near where your electric car is parked.
- Low impact on electric utility peak demand charges (often applied to commercial accounts).

Disadvantages

- Slow charging, typically 3-5 miles of range per hour.

Level 02 Charging:

- Level 2 charging uses 240-volt power to enable faster regeneration of an EV's battery system. Providing this type of charging requires installation of an EVSE unit and electrical wiring capable of handling higher voltage power. Plug-in America's Plug Star

tools offer a listing of Level 2 EVSE currently on the market. Many utilities are offering free level 2 charging equipment and/or incentives with an electric car purchase. Visit our incentives page to learn more.

Advantages

- Faster charge time - typically 10 – 20 miles of range per hour of charge.
- More energy efficient than Level 1 - about 3% gain in efficiency.
- Variety of EV charging manufacturers provides differentiated products for distinct markets and requirements, including networked systems that can schedule charging, track use, and collect fees.

Disadvantages

- More expensive than Level 1.
- Potentially higher impact on peak kilowatt demand charges for businesses.

Level 03 Charging:

- DC fast charging provides compatible vehicles with an 80% charge in 30-60 minutes by converting high voltage AC power to DC power for direct storage in EV batteries. Automakers currently use the same Society of Automotive Engineers (SAE) J-1772 plug for level 1 and 2 charging, with the exception of Tesla which has an adapter. For DC fast charging there are three plug types used by different automakers: the CHAdeMO, SAE Combined Charging System (Combo/CCS), and Tesla Supercharger. Nissan and Mitsubishi vehicles use CHAdeMO while current and upcoming vehicles from US and European manufacturers have SAE CCS ports. Tesla's Supercharger equipment is only compatible with Tesla vehicles, although they offer an adapter which allows Tesla owners to use CHAdeMO equipment.
- Our electric car fact sheet includes a table with information on DC fast charging plug types by model. Most DC fast charging equipment manufacturers now offer equipment with both the CHAdeMO and SAE CCS port connectors to increase compatibility.

Advantages

- Charge time is reduced drastically--it's nearly as fast as refueling a gasoline vehicle.
- Variety of charging equipment manufacturers provides differentiated products for distinct markets and requirements.

Disadvantages

- Significantly more expensive than Level 1 or Level 2 equipment and high voltage 3 phase power connections to utilities further increases installation costs.
- Potentially increased peak demand charges for commercial locations.
- Different plug types are confusing to potential EV buyers and charging station operators.
- Depending on the vehicle and charging equipment, fast charging can be slowed during cold weather.

Q10. Explain the general electrical troubleshooting procedure in an automotive vehicle.

Answer:

With time, every mechanic will gradually develop its own troubleshooting procedure. Until then, using a general troubleshooting procedure will help you get there and learn what works best for you at the same time.

The most important steps are:

1. **Confirming the problem**

Customers don't always provide an accurate and detailed description of the problem at hand. If a driver notices a problem in the lighting system of his vehicle, he will usually indicate that "a light bulb doesn't work". This kind of description really does not say much about the nature of the problem. It is therefore essential to check the whole lighting system to find out which lighting device is not working before everything else.

2. **Intermittent electrical problems**

It's also important to investigate to see if the problem is present at all time or intermittent. Finding the source of an electrical problem is hard enough without having to perform tests on a circuit while everything is in good working condition. Sadly, in the case of an intermittent problem, there's not much to be done. It's almost impossible to locate a faulty component when the problem is not present.

3. **Developing a hypothesis**

Write down a list of the most likely culprits and keep it within reach. Your hypothesis doesn't have to be 100% right all the time and you shouldn't feel tied down by it. Its purpose is only to give you a starting point for the troubleshooting process. As you gain experience, you'll learn to pose better hypotheses which should allow you to skip some steps and jump right down to where the problem is most likely located right away.

4. **Collecting technical information**

Before starting any kind of troubleshooting on an electrical system, get your hands on your car's **repair manual** and find out the wiring diagram corresponding to the system concerned. Having access to electrical diagrams to perform your test is a definite advantage and is not to neglect.

5. **Performing the preliminary steps**

If the electrical problem is permanent and related to a particular circuit, start by performing a visual inspection of the circuit in question. The cause of an electrical problem is sometimes obvious and performing a visual inspection could save you some precious time.

The main elements to visually inspect, depending on the electrical circuit involved, are:

- Loose battery terminals;
- Main electrical connectors;
- Control modules ground;
- Engine, transmission and body grounds.

If the problem is intermittent, check the electrical sub-circuits of the circuit in question for:

- Partially disconnected connector;
- Deformed or damaged connector plugs
- Bad electrical splice;
- Electrical circuit too close to a magnetic field;
- Antifreeze or brake fluid on the connections.
- Testing the battery

6. Troubleshooting

Inspect the main components of the system

9 out of 10 times your troubleshooting will stop right there. The cause of an electrical problem is most frequently the main component of the system.

For example, if the LR (Left-Front) blinking light stops working, the light bulb is most likely burnt. If the RF window stops going up or down, there's almost 90% chance that the RF power window regulator is at fault. If it's not, the culprit is most likely the second most important component, namely the power window main switch.

- **Testing the fuses**

If there's no power coming to the motor, the next step is to check the fuses. Electrical systems are divided into sectors, and each sector has a fuse protecting it against overloads.

The fuse consists of a lead wire placed on a support and integrated into the input circuit of the sector. Lead is a metal that heats up easily when the current passes through and quickly melts and cuts off the current in the sector instantly in case of overload.

A blown fuse is often a consequence of an electrical problem and rarely the cause of it. Make certain that you find what caused the fuse to blow in the first place before replacing it or it will simply blow again.

- **Visually**

Locate the fuse protecting the electrical circuit on your car wiring diagram. A number or code next to it should indicate where it's found on the vehicle.

Use the fuse removal tool provided with the fuse box to easily remove the fuse and inspect it. If you notice a black spot or if the lead wire looks like its cut in half, the fuse is definitely blown and needs to be changed.

- **Using a multimeter**

To test a fuse using a multimeter, select the continuity test or resistance mode. Try to touch both positive and negative probes together and note down the value displayed on the multimeter. Different multimeter will display different codes or sounds to indicate continuity or an Open Loop condition.

Place the probes of the multimeter on the two metal blades at the back of the fuse. If a beep is heard or some resistance reading is displayed, the fuse is still good. On the other hand, if it doesn't beep or "OL" appears on the multimeter, the fuse is defective and will need to be replaced.

- **Using a test light**

A test light is the best tool to use for fuse testing. In fact, a test light typically can't tell you anything else than if there's power or not. No voltage reading is available but when the time comes to test a fuse, that's all we need.

With the ignition key turned on, connect the test light clip to the negative terminal of the battery and alternatively touch the fuse's metal blades with the probe. If the fuse is blown, the test light will light up only when touching one of the two metal blades.

7. Isolating the problem

The key here is to eliminate a good part of the circuits and to concentrate the research on the sub circuit which could be at the source of the problem. Since the problem is not the motor, nor the power source, the faulty component can only be located in two places: between the motor and the power source or between the motor and the ground.

Depending on the results of the test you've performed so far, you are now looking to find why either the power or ground is not being measured at the connector. If there's no 12v to the connector, inspect the circuit ahead of the motor. Start with the power distribution center or just after the fuse. Follow the wire and test it at every connector along the way until you find one with no power.

Same thing for the ground but in the opposite direction. Inspect the system wiring diagram and find the location of the ground for this motor. Remove the trims, follow the ground wire and inspect it for damages as you go.

8. Performing the repair

This one is pretty self-explanatory. Once you have found the cause of the electrical problem, you can then formulate a diagnostic with confidence in mind and repair the whole thing.

In the case of a burnt component, make sure you clearly understand what caused it to burn in the first place before you replace it. Failure to do so could result in the component blowing up again the moment you plug it back in. If there's a short on the wire or a skinned ground wire is touching another 12v power source, the current could instantly ruin expensive internal electronic elements. Only reinstall the new part once you have repaired the problem.

9. Performing post-repair verifications

Never forget to confirm the repair before putting the car back on the road. Nothing is more frustrating than dedicating hours into troubleshooting a faulty radiator fan, taking the car out for a drive right after you have replaced the fan relay only to find yourself stranded on the side of the road with an overheating engine minutes later and in need of a tow truck.

10. Wrapping it up

Electrical problems can sometimes be intimidating and somewhat daunting at first. Rest assured, with the help of your **vehicle's repair manual** and some basic electrical troubleshooting knowledge, everybody should be able to find and fix most electrical problems in no time.

Q11. Explain Vehicle's Electrical Starting System equipped with the ESB (Emergency Starting Battery) with an appropriate circuit diagram.

Answer:

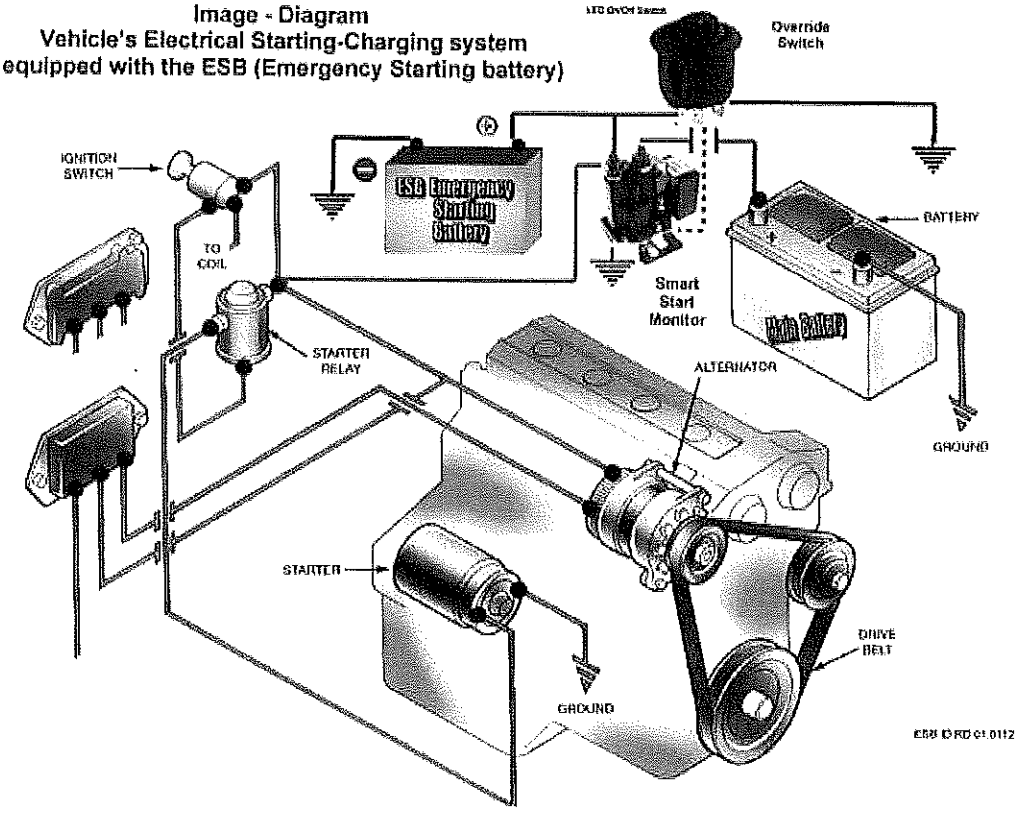
ESB, Emergency Starting Battery VS (Vehicle Series)

ESB, means "Emergency Starting Battery." A new manufacturing innovation in the battery field. A very promising proposal which will offer more safety and reliability to the automotive world.

An innovation which will insure you reach your destination safely. ESB can be used mainly as an alternative (saving) back-up emergency starting battery, which is installed and directly connected to the vehicle's electrical power system. It is a battery that will get you out of a difficult situation and will start your engine when the main battery will just not do it.

The ESB further improves the passenger's safety regarding all possible consequences that might be followed after a power failure from the vehicle's main battery. It provides an interruptible (or manual) power back-up support for the purpose of engine starting and certainly for all other electrical consumption loads.

Image - Diagram
Vehicle's Electrical Starting-Charging system equipped with the ESB (Emergency Starting battery)



What does it mean to be equipped with an ESB battery?

• You will never have to worry again that you might not get to your destination due to a dead battery.

• You will never be in danger of waiting for help, on the road, or out in the middle of nowhere. You will safely reach your destination.

ESB is a very handy 12V rechargeable sealed - without maintenance battery with long life time (5-10 years) and with a quite low manufacturing cost. It is very small in size and lightweight. It weighs 6.60 pounds approximately and offers a very high rate starting current, from 200Amps to 800Amps.

Due to the very low self-discharge rate, even if the vehicle is parked for 4 months the ESB will always be ready to start your engine.

It uses safe technologies, total recyclable materials and it can be mounted in any orientation. It is US DOT and IATA certified as non-spillable battery.

The ESB battery could be manufactured in two different battery technologies.

A. In VRLA (PbCaSn) technology (with the weight of 6.60 pounds).

B. In LiFePo4 nanotechnology based innovation (with the weight of 3.30 pounds).

It is quite easy to be installed. It could be activated manually, or be in a fully automatic mode by using optional a smart start monitors for an interruptible battery power operation. "You will never need to get out of your vehicle; you just carry on and drive."

ESB is charged separately in the same way as the main vehicle's battery. Installation could be placed at the vehicle's manufacturing plant, as from the authorized technical partners too.

Conclusion

ESB is ready to be applied in the automotive industry and perhaps in the future it might be a new standard to the international motor vehicle market. A low cost, highly efficient product that offers much further increased transportation's safety and reliability. A proposal that will definitely improve our automotive life.

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Registration No.: .....

School of Automotive Skills

Session: 2021-22 (Winter Semester)

B. Voc. Program, 5th Semester,

2nd In-Sem. Examination

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

Course Name: Workshop Management **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.
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Section – A

05X01 = 05 Marks

Q1. Which of the following is a technique used for forecasting?

a) Gantt Chart
b) CPM
c) Exponential Smoothing
d) Control Chart

Q2. Cause and effect diagram can be used to educate and train personnel in decision-making and corrective-action activities?

a) True
b) False

Q3. The Bathtub curve indicates failure probability, which stage is not normally associated with the bathtub curve?

a) Normal life, where few failures occur.
b) Wear-out, where failure occurs due to age.
c) Infant mortality, where failure occur early.
d) Pulling the plug where the production is halted, due to unaccepted number of failures.

Q4. Which of the following is not a quantitative forecasting method?

a) Moving Average
b) Simple Average
c) Delphi Method
d) Exponential Smoothing

Q5. Breakeven point Indicates:

a) Recovery of fixed cost
b) Recovery of variable cost
c) Both A and B
d) Recovery of fixed cost, variable cost and margin of safety

Section – B

03X02 = 06 Marks

Q10.The past data about the sales of washing machine in a company outlet is as follows:

Compute the forecast for the month of December 2020 using four month moving average method?

Month (2020)	Sales (in numbers)
May	320
June	350
July	340
August	320
September	400
October	310
November	325

Q7. Write down the advantages and disadvantages of Fishbone Diagram?

Q8. What do you understand by MTTF and MTBF?

Section – C

03X03 = 09 Marks

Q9. Explain Delphi method.

Q10. Explain Historical analogy, Customer survey and Grassroots Forecasting.

Q11. Draw bathtub curve and explain it.

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Section – A

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BHARTIYA SKILL DEVELOPMENT UNIVERSITY

School of Automotive Skills

Session: 2021-22 (Winter Semester)

B. Voc. Program, 5th Semester,

2nd In-Sem. Examination

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

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

Section – A

05X01 = 05 Marks

Q1. Which of the following is a technique used for forecasting?

c) Exponential Smoothing

Q2. Cause and effect diagram can be used to educate and train personnel in decision-making and corrective-action activities?

a) True

Q3. The Bathtub curve indicates failure probability, which stage is not normally associated with the bathtub curve?

d) Pulling the plug where the production is halted, due to unaccepted number of failures.

Q4. Which of the following is not a quantitative forecasting method?

c) Delphi Method

Q5. Breakeven point Indicates:

a) Both A and B

Section – B

03X02 = 06 Marks

Q6. The past data about the sales of washing machine in a company outlet is as follows:

Compute the forecast for the month of December 2020 using four month moving average method?

Month (2020)	Sales (in numbers)
May	320
June	350
July	340
August	320
September	400
October	310
November	325

Ans:

Ans: Forecast for the month of December 2020 can be calculated as

given(n=4)

$$F_{December} = \left(\frac{1}{4}\right)\left[\text{August} + \text{September} + \text{October} + \text{November}\right]$$

$$= \frac{1}{4}\left[320 + 400 + 310 + 325\right]$$

$$\Rightarrow 338.75$$

Q7. Write down the advantages and disadvantages of Fishbone Diagram?

Ans:

Advantages:

a) Easy to understand
b) Helps find most likely cause of problem
c) Can be applied whole range of problems
d) Whole team gets better understanding of issues

Disadvantages:

a) Doesn't help you prioritize causes
b) The output from brainstorming is only as good as your brainstorming session
c) Can become unwieldy to use
d) You may waste a lot of time discussing causes that have very less impact on the problem

Q8. What do you understand by MTTF and MTBF?

Ans: MTBF -Mean Time Between Failures-The average time between failure occurrences. The number of items and their operating time divided by the total number of failures. For Repairable Items

MTTF -Mean Time To Failure-The average time to failure occurrence. The number of items and their operating time divided by the total number of failures. For Repairable Items and Non-Repairable Items

Section – C

03X03 = 09 Marks

Q9. Explain Delphi method.

Ans: **Delphi method:** It is an iterative group process intended to achieve a consensus forecast. In this method, the coordinator prepares a comprehensive questionnaire related to the problem under study. He circulates the questionnaire to a panel of experts from diverse backgrounds both inside and outside the organisation, eliciting their response. Response of the experts are kept anonymous so that honest opinions from them are obtained. Subsequently, the coordinator compiles, edits and summarises all the responses to extract meaningful information from it and then prepares new questionnaire for the problem under study. He circulates the new questionnaire to the same set of experts again for responses. This process is continued until satisfactory overall prediction is obtained from experts. Delphi method is particularly useful for technological forecasting purposes.

Q10. Explain Historical analogy, Customer survey and Grassroots forecasting.

Ans:

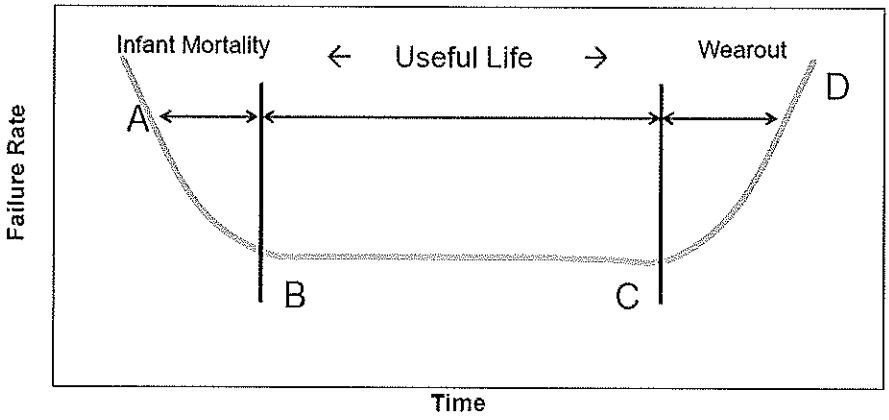
1. **Historical analogy**: In this type of forecasting, life cycles of similar products and services in the market are compared for getting insights to future developments. It is based on the assumption that demand pattern at each stage of life cycle for future events would follow similar pattern as that of past events.

2. **Customer surveys**: Companies also solicit inputs from customers as they are the ones who control the demand for any product. Customer surveys help companies to get critical inputs on various aspects of a product. They are usually used for short to medium range forecasting purposes

3. **Grassroots forecasting**: In this type of forecasting, people at the grassroots level in an organisation, i.e. those who are in direct contact with customers are taken as good source of information for inputs to forecasting process. For example, sales staff or customer service personnel have data related to changing pattern of consumption of customers, performance of competitive products, overall
distribution of market share, etc. These data could judiciously be used for forecasting purposes.

Q11. Draw bathtub curve and explain it.

Ans: The failure rate is expected to vary over the life of a product –**'Bathtub Curve'**



A-B Early Failure / Infant mortality / Debugging / Break-in
•'Teething' problems. Caused by design/material flaws
Eg: Joints, Welds, Contamination, Misuse, Misassemble

B-C Constant Failure / Useful life.
•Lower than initial failure rate and more or less constant until end of life

C-D End of life failure / Wear out phase.
•Failure rate rises again due to components reaching end of life
Eg: Corrosion, Cracking, Wear, Friction, Fatigue, Erosion, Lack of PM

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School of Automotive Skills

Session: 2021-22 (Winter Semester)

B. Voc. Program, 5th Semester,

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Course Code: AUT1504 **Time: 1 Hours**

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

Instruction:

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

Section – A

05X01 = 5 Marks

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

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

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

a. Airflow and Movement
c. Type of substrate
b. Surface temperature
d. Solvent selection

Q. 3 The best light for color matching?

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

Q. 4 Which statement is incorrect related to masking?

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

Q. 5 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

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Section – B

02X03 = 6 Marks

Q. 6 Explain different types of borders used in masking.

Q. 7 Write the steps for color matching?

Q. 8 Write the Parameters involved in cost estimation?

Section – C

03X03 = 9 Marks

Q. 9 Write the steps for standard repair.

Q. 10 Discuss about the paint mixing room.

Q. 11 Make a checklist for spray booth maintenance.

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Section – A

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Section – B

02X03 = 6 Marks

Q. 6 Explain different types of borders used in masking.

Ans. The 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. 7 . 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.

Q. 8 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.

Section – C

03X03 = 9 Marks

Q. 9 Write the steps for Standerd Repaire.

Ans

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 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.