



**Answer the following 5 questions:**

**Question No. (1):**

[20 Marks]

➤ **True or False and correct the false ones?**

1. Low initial cost is one of the advantages of Mechatronics systems.
2. Trained workers with only one engineering field background is essential in Mechatronics systems.
3. Mechatronics systems does not include sensors and actuators elements.
4. In a measurement system, the transducer performs filtering, amplification, or other signal conditioning on the transducer output.
5. In mechatronic systems, signal processing facilitates the higher-level monitoring of the manufacturing operation.
6. Sensor's accuracy is the measuring instrument's property to respond to the measured quantity changes.
7. LVDT sensor has three primary and four secondary coils with same number of turns for primary ones.
8. A dummy gauge can be used with the strain gauge in Wheatstone bridge to remove the pressure effect.
9. Absolute encoder must have an external processing of signals to obtain the angular position of a motor.
10. The insurance that a mechanism will exhibit motion that will accomplish the set of requirements is called Mechanism's synthesis.
11. In mechanism's kinematics analysis, the required maximum force of a mechanism must be determined.
12. Cam and follower mechanism can transform a translational motion into a rotary motion.
13. Higher order joint allows rotary motion between the two links that it connects.
14. Crossed-belt drive is used when driven and driving pulleys are to be rotated in the same direction.
15. The frame is the mechanical portion of a machine that has the function of transferring motion and forces from a power source to an output.
16. fluid link is a link which is partially deformed in a manner that affects the transmission of motion.
17. Pin or hinge joint allows pure translation between the two links that it connects.
18. Point of interest is typically the part of the mechanism or the machine that exhibits no motion
19. If a link is in a pure translation, the orientation of the link will be variable
20. Revolute joints may allow both rotation and sliding between the two links that it connects.

**Question No. (2):**

[15 Marks]

➤ **Choose the correct answer:**

- 1- A good example of manufacturing applications of mechatronics system is .....  
a- Automobile    b- high speed train    c- Segway robot    d- CNC machines    e- all of the above
- 2- The sensor's ..... measures the difference between the measured value and actual value.  
a- repeatability    b- sensitivity    c- precision    d- accuracy

- 3- A ..... sensor can be found in Laptop track Pads.  
 a- capacitive                      b- inductive                      c- both a and b                      d- none of the above
- 4- LVDT can be considered as ..... sensor.  
 a- capacitive                      b- inductive                      c- resistive                      d- none of the above
- 5- The gauge factor of a strain gauge is .....  
 a-  $\frac{\Delta R/R}{\Delta L/L}$                       b-  $\frac{\Delta L/L}{\Delta R/R}$                       c-  $\frac{\Delta R/R}{\Delta D/D}$                       d-  $\frac{\Delta R/R}{\Delta \rho/\rho}$
- 6- In the Encoder, .....is used to filter signal into square wave used by microcontroller.  
 a- Mask                      b- LED                      c- Photodetector                      d- Electronic board
- 7- The.....encoder keeps the correct position value in case of loss of power.  
 a- single channel incremental    b- Dual channel incremental    c- absolute    d- none of the above
- 8- The heart of any machine that is used to transfer motion from power source to an output is called.....  
 a- kinematics                      b- dynamics                      c- both a and b                      d- none of the above
- 9- .....involves determination of position, velocity, and acceleration of a mechanism  
 a- Kinematics                      b- Dynamics                      c- Both a and b                      d- None of the above
- 10- If a link is in a complex motion, the orientation and the translation of the link will be .....  
 a- constant                      b- variable                      c- Both a and b                      d- None of the above
- 11- Links can be classified depending upon their type of connections into.....  
 a- binary                      b- ternary                      c- quaternary                      d- none of the above
- 12- A motor gear has 60 teeth and rotates at 100 rev/min. The driven gear has 30 teeth is connected through a 50 teeth gear to the driver to have the same direction of the driver. The driven rotational speed will be.....of the driver speed.  
 a- twice                      b- half                      c- equal                      d- none of the above
- 13- In ..... gear train, the axis of the first and the last gears are co-axial and used clocks.  
 a- simple                      b- compound                      c- reverted                      d- planetary
- 14- To transfer power between two rotating shafts with distance between them equal to 2 meters, the ..... belt is more desirable.  
 a- Flat                      b- V-shape                      c- circular                      d- timing
- 15- The ..... belt is mostly used in where a moderate amount of power is to be transmitted from one pulley to another.  
 a- Flat                      b- V-shape                      c- circular                      d- timing





