Part -I-CHOOSE THE CORRECT ANSWER

1. If there are 3 identical resistors connected parallel the total resistance willbe.
   A) 3 time eachindividualresistors B) 2/3 times each individualresistor
   C) 1/3 times eachindividualresistors D) 4/3 times each individualresistors
2. The responsible person to maintain the quality of work performed by a workteam.
A,supervisor **B, all members oftheteam**C,worker D, quality assuranceofficer
3. Resistivity of a conductor is mostly affectedby.
A,composition B, pressure C,Temperature D, current
4. Written communication methods mayinclude.
A) Discussion B)Negotiation C)Speeches **D)Instructions**
5. What should you do when a problem arises while you are repairing electronic equipment that you Cannot solve by yourself?
A,quitrepairing B, throwitaway C, askfor assistance D, murmuring &crying
6. What is the power factor incapacitive
A,zero B,unity C,lagging D, leading
7. The starting winding of a single phase motor is placed inthe----
A.rotor B.stator C.armature D, field
8. The frequency of DC supply is…….
A,zero B,16HZ C, 50 HZ D, 100HZ
9. The demand factor for the electrical system is the ratioof
   A) Maximum demand to connected load B) Maximum demand to averageload
   C) Average power tomaximumpower D) Relative power to total power
10. Dielectric materialsare
   A) Insulatingmaterials B) Semiconducting materials
   C)Magneticmaterials D) Ferroelectricmaterials
11. Transformer cores are laminated in orderto:
   A) Simplifyitsconstruction B) Minimize eddy currentloss
   C) Reduceloss D) Reduce hysteresis'sloss
12. Star – delta starter of an inductionmotor
   A) Inserts resistance inrotorcircuit B) Inserts resistance in statorcircuit
   C) Applies reduced voltagetorotor D) Applies reduced voltage tostator
13. Brushes of D.C. machines are usually madeof
A) Hardcopper B)Softcopper C)Carbon D)All ofabove
14. The minimum change in input value that can be detected by measuringcalled
A) Threshold B)Resolution C)Sensitivity D)Error
15. Multiplying resistor is requiredin
A) Ammeter B)Power C)Ohmmeter D)Voltmeter
16. One of the following devices can be used to isolate the control circuit from theload.
A) Toggleswitch B)Relay C)Circuitbreaker D)Rotaryswitch
17. The aim of preventive maintenance isto
A) Increase the reliability of a toolor equipment. B) Increase the failure rate of tool orequipment.
   C) Reduce the life span of a toolorequipment. D) Improve the standard quality of a tool orequipment.
18. A transformer having 1000 primary turns is connected to a 250V AC supply for a secondary voltage 400 V. The number of secondary turns shouldbe
A) 1600 B)250 C)400 D)125
19. An electronic component which is used as switchingdevice
A) Capacitor B)Zenerdiode C)Resistor D)Transistor
20. Basic meter movement has an internal resistance of 50hom and full scale deflection current 150MA. What will be the value of the shunt resistor required tomeasure?
A) 20Ω B)35Ω C)15Ω D)50 Ω
21. The difference between the synchronous speed and the actual speed of an induction motor is knownas
A) Regulation B)Backlash C)Slip D)Lag

MECHATRONICS LEVEL 4 V1

Part II. Matching A and B

Column A

____1. DC Motor With constantSpeed H

____2. Motor with High startingTorque G

____3. Current limitingDevice C

4. Used To Store Program & Data in Computer System J

____5. Proper Attitude towardWork E

6. Performance of Operation or Quality ofProduct or Service to ensure customer satisfaction ismonitored. K

7. Constrictive & Encouraging Idea for Improvement I

____8. VoltageTransformer R

____9. CurrentTransformer Q

____10. WashingMachine M

____11. The Unit ofInductance A

____12.Rectifier O

____13.Inverter P

14. Team Member Understand How TheirTasks Fit In With Other People'stasks. L

15. Each Members Co-operating with Everyone and assisting others when they needhelp. F

Column B

A. Henry

B. SpindleMotor

C. Varistor

D. Memory

E. Effective Communication

F. Initiative

G. Dc SeriesMotor

H. ShuntMotor

I. FeedBake

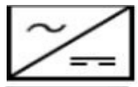
J. Hard Disk Driver

K. Quality Control

L. Successful Teamwork

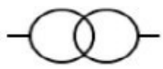
M. 

N. 

O. 

P. 

Q. 

R. 

MECHATRONICS LEVEL 4 V1

Mechatronics Level-IV COC

Answers key

Part -I-CHOOSE THE CORRECT ANSWER

1. C
2. B
3. C
4. D
5. C
6. B
7. B
8. A
9. A
10. A
11. B
12. D
13. C
14. B
15. D
16. B
17. A
18. A
19. D
20. C
21. C

Part -II-Matching A and B

1. H
2. G
3. C
4. J
5. F
6. K
7. I
8. R
9. Q
10. M
11. A
12. O
13. P
14. E
15. L

MECHATRONICS LEVEL 4 V1

Mechatronics Level-IV COC volume 2

Section -A-CHOOSE THE CORRECT ANSWER

1. _____Find the measurement of voltage with main value greater error and with main value with standard error if series of voltage measurement is asfollows

1	2	3	4	5	6	7	8	9	10
3.56	3.50	3.51	3.40	3.41	3.51	3.53	3.45	3.49	3.44

A.3.49V +/- 0.05V and 3.50V+/- 0.02V B.3.50V +/- 0.05V and 3.50V +/- 0.01V C.3.56V +/- 0.05V and 3.50V+/- 0.02V D.3.53V +/- 0.05V and 3.54V +/-0.01V

2. _____Analogue display in instrumental have the followingadvantage
   A. The display can be set at any value between 0% and100%
   B. Read off errors due to parallaxscale
   C. No conversion, readingmoreaccurate D.Measured value outputdirectly
3. _____Determination of electrical resistance from voltagemeasurement in measuringmethod
   A.Direct B.comparison C.Indirect D.Record
4. _____Limitation of digitalinstrumentation
   A.Conversion of analogueanddigital B. Less affected by noise
   C.Greater accuracyandprecision D. Easy to storeinstrumentation
5. _____Errors that remain constant though all repetition of measurement is said tobe

A.Randomerror B.Crosserror C.Systematicerror D. Deviationerror

6. _____A process control system isstable
   A. If the controlled variable is to oscillate above andbelow
   B. If it can return the controlled variable to steadystate
   C. If oscillation and steady state value present in the O/pstage
   D. If both oscillation and steady state value present in the I/Pstage
7. _____Potentiometers and bridges areclassifiedas_ ____instrument A.Indicatinginstrument B.Comparisoninstrument C.

MECHATRONICS LEVEL 4

Recordinginstrument D.Controllinginstrument

8. In measuring instrument to measure AC voltage additional thing must be inserted for (DC voltage measurement) What isthat

A.Rectifier and consideringRMSvalue B. Transistor and considering peak to peak voltage C.An inductor and considering average value D.capacitor and considering compensatingvalue

9. _____Which of the following operation of machine categorized in open-loop control system A.Packing ofbeer B.Packingofmilk C.Washing machine D.Pasteurizing ofmilk

10. The pre-requisite for any measurementin

A. To know the dimension of measuredvalue

B. Knowledge of which physical quantities can be measured and how they aredefined

C. To know which physical quantities tomeasure

D. To know the reference of measuredvalue

11. It is a science of technology of complete systems designed to measure physical quantities so as to obtaindata

A.Meterology B.Instrumentation C.Mechatronics D.Comparisoninstrument

12. _____In a device that receives energy from one system in one form and re transmits it to anothersystem

A.Relay B.Altrasonicsensors C.Limitswitch D.Transducer13._____Active transducer are sometimes is said tobe

A.Self-generatingtransducer B.Resistance C.Capacitance

D.Inductance14._____If one project work value commissioned, thisindicates

A. The project are still underway inconstruction

B. The project are still running withproblem

C. The project are invalid all materials are not inoperation

D. The project has successfully finished and all material are ready foroperation

15. _____For a quality control of one factory section the basic idea needed could be A.There must be enoughrawmaterial B.There must be enough main power C.There must be enoughskilledtechnician D.There must be enough referencepoint

16. Reputation for consumers electrical installation issued by EEPCOshows the entry for power supply the color whiteindicate

A.Phase(R) B.Phase(S) C.Neutral(O) D.Ground17.__The word calibrate in mechatronicsindicate

A.Supplygiving feedback B. Supply giving set point

MECHATRONICS LEVEL 4

C.Supply givingoutputvalue D.Supply giving measuredvalue

18._____An example of indicatinginstrument

A.Kilowatthourmeter B.Potentiometer C.Ammeter D.Bridge19._____One of the following measuring instrument determines thetime characters of quantities

A.Digitalmultimeter B.Ammeter C.Oscilloscope D.Whistonebridge

20._____The best application of capacitive transducer element in any liquidfactory

A. To identify filled or under filled and overfilledcontainers

B. To identify number ofcontainer

C. To identify sizeofcontainer D.Toidentify presence of container 21._____Which one of the following steps take priority in any technicworks

A.Measurementaccuracy B.Use safety equipment

C.Knowingwork D.How to readmanual

SECTION-B- MATCHING TYPE QUESTIONS INSTRUCTIONS FOR SECTION B

- There are fifteen (15) questions in thissection.
- Match column A with column B. Select the letter of the correct answer from column B and write your answer in the answer sheetprovided.
- If you wish to change your answer, place an **X** mark through the letter you have written and then write the letter of your preferredanswer.
- A correct answer scores 1, an incorrect answer scores 0. Marks will not be deducted for incorrect answers. No marks will be given for a question if more than one one answer issupplied.

Column A	Column B
_____1.Candela _____2.Errorsignal _____3.Transducersignal _____4.Truly digital and itsoutput _____5.Photo voltaicdevices _____6.Inductivesensor _____7.Damper _____8.IEC _____9.Mechatronics _____10.Negativefeedback _____11.Proximityswitch _____12.Metricunit _____13.Servomotor _____14.Passivetransducer _____15.Closedcontrol	A. Opticaltransducer B. Steepermotor C. Luminousintensity D. Sense for conductive material E. Algebraic sum of reference signaland feedbacksignal F. Sensor G. The combination of mechanical, electrical electronics andprogramming H. Sense limitspace I. Oscillationabsorber J. Systeminternational K. Motor with desired speedcontrol L. Resistancetransducer M. Withfeedback N. Britishsystem O. Absoluteerror P. International electro technicalcommission Q. Output affectinput R. Withoutfeedback S. Kilobyte T. Thermistor

MECHATRONICS LEVEL 4

Answers key

Section -A-CHOOSE THE CORRECT ANSWER

1. B
2. A
3. C
4. A
5. C
6. B
7. B
8. A
9. C
10. C
11. B
12. D
13. A
14. D
15. D
16. D
17. B
18. C
19. C
20. A
21. B

SECTION-B- MATCHING TYPE QUESTIONS INSTRUCTIONS FOR SECTION B

1. C
2. E
3. F
4. B
5. A
6. D
7. I
8. P
9. G
10. Q
11. H
12. J
13. K
14. L
15. M

MECHATRONICS LEVEL 4

Mechatronics Level-IV- version -3

Part -I-CHOOSE THE CORRECT ANSWER

1. A group of physical component combined to perform a specificfunction.
   A) Pressure **B) System** C)Actuator D)Stability
2. Pictorial representation of the cause and effect relationship between the input and output of a physical system. **A, Blockdiagram** B,Circuit diagram C,Valve D, Filter
3. Supplies air to the pressure vessel through a pipe line and resistance to flow is provided by a constriction.(UC5,9) A, Hydraulicpowersystem B,Electromechanicalsystem **C, Pneumaticsystem** D, Transferfunction
4. Electrical maintenance.
A) Is safe to useunforeseencircumstances B)Is illuminated and heated to an appropriatelevel
C) Ensures the efficiency of theinstalledsystem D)Provides safe monitoring of industrial processes andsystems
5. A group of components which can complete certain tasks or achieve certain desired results in a desired manner while working together iscalledas____.
A,Outputsystem B,Sequencesystem **C,Control system** D, Succession system
6. A "competent" worker is one who:
A, Cannot do the jobortask **B, Has been trained to do a job ortasksuccessfully**
C, Can do the job or task more quickly thananyoneelse
D, Is quarrelsome and likely to cause an argument atwork
7. An appropriate performance indicator that a small business might use to evaluate its level of social responsibility is.
A. Results of a customersatisfactionsurvey B. Profit **C. Rate of greenhouse gas emissions generated over a period oftime** D, Staffturnover
8. On-off control is also called as
A, Onepositioncontrol **B, Twopositioncontrol** C, Fourpositioncontrol D, Half positioncontrol
9. In which stage the measurement system comes in contact with the measured or the quantity to be measured?
   A) **Transducerstage** B) Signalprocessorstage C)Outputstage D) Productionstage
10. A cyclical process that involves data gathering, interpretation and identification of the problem areas and possible actingprograms.
   A) Benchmarking B) Asset C)Profit **D)Diagnosis**
11. The transformation of a set of input, which may be material, actions, methods and operations into desired outputs in the form of aproduct.
   A) Control **B)Process** C) Automation D) Sensor
12. The term given to programs stored in ROMs or in programmable devices which permanently keep their stored information.
   A) Hardware B)Software **C)Firmware** D) Universal serialbus
13. Deciding now what we are going to later including when and how we are going to doit.
   A) **Planning** B) Activity C)Monitoring D)Evaluation
14. Which one is displacement measurementsensor?
   A) **Resistivesensor** B) Light sensor C)Temperaturesensor D) Light emittingdiode
15. What is the input of the data acquisition system (DAS) to which a transducer is connected called?
   A) Controlelement B) Interface **C) Channel** D)Function
16. The signal produced by changing the air pressure in the signal pipe in proportion to the measured change in a process variable.
   A) Digitalsignals B) Analogsignals C) Resistivetemperaturedevice **D) Pneumaticsignal**
17. Which one is a passive sensor?
   A) **Thermocouple** B)Thermister C)Straingauge D)Silicon
18. The region between the limits within which a quantity is measured, received or transmitted, expressed by stating the lower and upper rangevaluesis_____.
   A) Instrumentrange **B) Calibrationrange** C) Zeroerror D) Field standard
19. The main objectives of maintenance are
   A) To obtain plants and equipments at its minimumoperatingefficiency **B) To safeguard instruments by minimizing rateofdeterioration** C)Help in implementation of wrong procedures for storage and consumption of spares
   D)To hinder management in taking decisions on replacements or newinvestment

20. The main advantages of closed-loop control system
A) **Reduced sensitivitytodisturbance** B) Complex and expensivetoconstruct C) The loss ofgain
D) Quiet easy to become unstable

21. Team commitment and cooperation is developed through

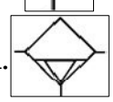
A) Poor communication and effectivedecisionmaking **B) Fostering mutual concern and camaraderie betweenteammembers** C) Fostering bad feeling betweenteammembers D) Dissatisfied communication and ineffectual decision making

Part II. Matching A and B

Column A

E 1. Controller
G 2. Disturbance
I 3.Feed back
C 4.Goal
J 5. Tolerance
B 6. Zero value
D 7.Harmonizing
A 8. Open-loop control system
P 9. Silencer
N 10. Damper
H 11. Uncertainty
F 12. Calibration interval
L 13. Control valve
R 14. Water separator automatic drain
K 15. Closed-loop system

Column B

A. Central heating boiler controlled only by atimer
B. The lower end of therange
C. Declaration of a desired endstate
D. Reconciles disagreements and relievestensions
E. Device that measures avariable condition
F. Period of time of use to ensure the equipment remainsreliable
G. Signal that tends to adversely affect the valve of the output of asystem
H. Error inmeasurement
I. The output of a system that is returned to modify theinput
J. Permissible deviation froma specifiedvalue
K. Automatic water levelcontroller
L. Device used to control the flow of fluids such as Steam orwater
M. Rectifier
N. Device used to control the flow of air in a duct or through a wall louver.
O. Voltagemultiplier
P. 
Q. 
R. 

Answers key

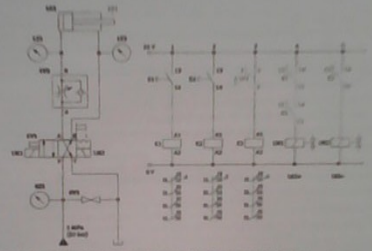
Part -I- CHOOSE THECORRECTANSWER

1. B
2. A
3. C
4. C
5. C
6. B
7. C
8. B
9. A
10. D
11. B
12. C
13. A
14. A
15. C
16. D
17. A
18. B
19. B
20. A
21. B

Part -II-Matching A and B

1. E
2. G
3. I
4. C
5. J
6. B
7. D
8. A
9. P
10. N
11. H
12. F
13. L
14. R
15. K

Occupational Code: EEELMIS L-4



Hydraulic and electrical circuit diagrams for the clamping device

key: -1A1 = Double-acting cylinder with cover

- S1, S2 = Pushbutton (normally open)

-1Z1, 1Z2= Pressure gauges

- 1B1 =Limit switch, electrical, actuated from the right

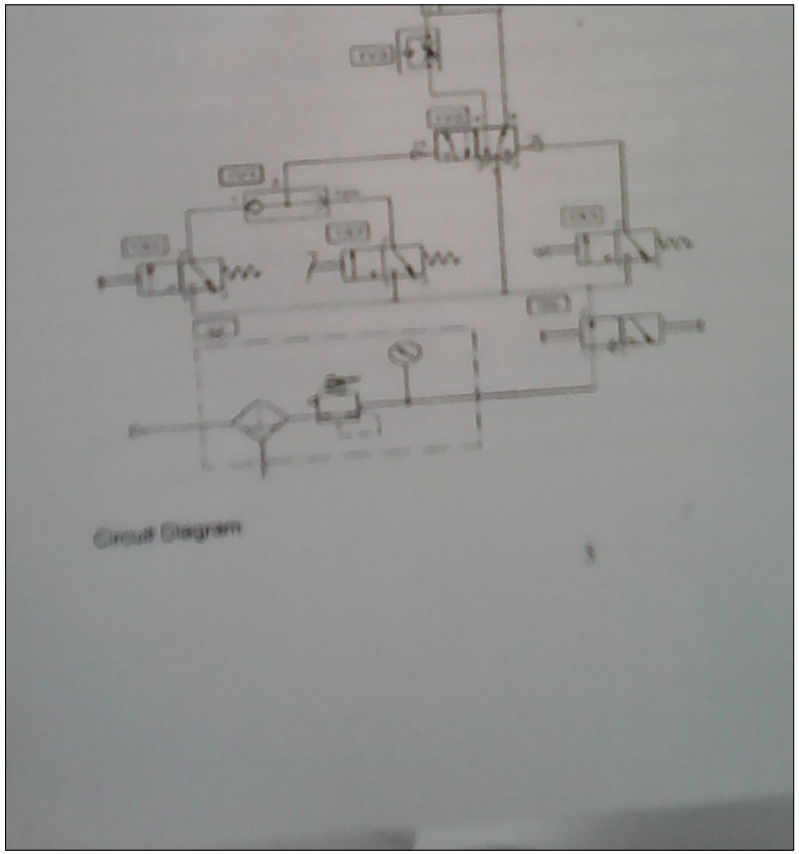
-1V2 = One-way flow control valve

- K1, K2, K3 =Relay

-1V1 = 4/2-way double solenoid valve

-0V1 = On-off valve

-1M1, 1M2 = Solenoid coil for 4/2-way double solenoid valve 1V1



Circuit Diagram