

Technical Interview Questions for Instrumentation Engineering

1. For what purpose Pirani gauge is used?

Ans. Low pressure measurement.

2. Psi stands for ____?

Ans. Pounds per square inch.

3. Low pressure is expressed in _____?

Ans. Torr.

4. What is the disadvantage of orifice meter & why they are preferred in the industries?

Ans. It gives a permanent pressure loss but due to their low cost they are preferred in the industries.

5. Bolometer is used as _____?

Ans. Radiation detector.

6. Stroboscope is used for the measurement of ____?

Ans. Angular velocity.

7. Electromagnetic flow meter is not suitable for which kind of fluids?

Ans. Non conductive fluids.

8. What is measurement?

Ans. It is an act of comparison between the unknown quantity and the standard resulting in knowing the magnitude of the unknown quantity in terms of the standard being used for the purpose of comparison.

9. What is an instrument?

Ans. It facilitates this process of comparison.

10. What is the difference between accuracy & precision?

Ans. Accuracy: it is the degree of closeness with which an instrumentation reading approaches to the true value of the quantity being measured.

Precision: it is a measure of reproducibility.

11. What is an embedded system?

Ans. A microcontroller based system designed for a specific task.

12. What are the various criteria of choosing of microcontroller?

Ans. memory, power consumption, packaging, market availability, speed of operation.

13. H-bridge is used for?

Ans. For bidirectional control of DC motor.

14. Damping mechanism used in PMMC is _____?

Ans. Eddy current damping.

15. What are the other name of multiplexer and demultiplexer?

Ans. Multiplexer: Data selector

Demultiplexer: Data Distributer

16. What is ring counter?

Ans. Counter based on register.

17. What is the difference between RACE condition and RACE Around condition?

Ans. RACE condition occurs in SR-FF and RACE Around condition occurs in JK-FF.

18. What is the difference between Latch and flip-flop?

Ans. Latch with clock pulses is called as flip flop.

19. What is a worldwide standard of 1 volt?

Ans. Saturated Weston cell with $E=1.01864$ volts.

20. Why damping torque is required in an indicating type of instrument?

Ans. To suppress the oscillations of the pointer at steady state position.

21. The material used in the fabrication of control spring in an indicating type of instrument is _____?

Ans. Phosphor Bronze.

22. Root locus method is best suitable for finding out which kind of stability of a system?

Ans. Relative stability.

23. Lead compensator is used for improving _____?

Ans. Transient response of the system.

24. Lag compensator is used for improving _____?

Ans. Steady state response.

25. IC family which shows lowest power dissipation _____ ?

Ans. CMOS (0.01 mw/gate).

26. What is FOM of IC family?

Ans. Speed power product is known as the Figure of Merit (FOM) of every IC family and it should be min.

27. ADC used in Digital Voltmeter is _____?

Ans. Dual slope (due to its good conversion accuracy and low cost).

28. What is Static Hazard?

Ans. If output of a logic circuit should remain constant at High Voltage level (1) but it goes low then we say static hazard exist.

29. In order to make a 4-bit parallel adder minimum circuitry required is _____?

Ans. One half adder and three full adder.

30. If a 10 kHz frequency signal is applied to a T-FF then what will be the frequency of output signal?

Ans. 5 kHz.

31. In RLC series circuit impedance at resonance is _____?

Ans. Minimum.

32. The device which is best suitable for the purpose of isolation of low voltage circuit from high voltage circuit is _____?

Ans. Optocoupler.

33. Energy meter at our home is an example of _____ type of instrument?

Ans. Integrating .

34. Why null type instruments are more accurate?

Ans. Since at the end of measurement they consume almost negligible power.

35. What is the basis of KCL?

Ans. Law of conservation of charges.

36. Why silicon is used in the fabrication of Zener diode?

Ans. Very low reverse saturation Current (nA).

37. Other name of Active transducer?

Ans. Self generating type of transducers.

38. What device you required for the purpose of interfacing of microcontroller with a DC motor?

Ans. Relay.

39. What is the range of LVDT?

Ans. 1.25mm to 250mm.

40. What is the frequency range of AC supply that can be applied to LVDT?

Ans. 50 Hz to 20 kHz.

41. Output impedance range of a practical OPAMP is _____?

Ans. 10 Ω to 100 Ω .

42. Fourier series can be written only for _____ signals?

Ans. Periodic signals.

43. Semiconductors used for the fabrication of LED come under the category of _____?

Ans. Direct Band Gap semiconductors.

44. Solar cells are made by using _____?

Ans. CdS, Ni-Cd

45. Doping level of a zener diode is _____?

Ans. 1: 10^5 .

46. What is baud rate?

Ans. No. of bit changes (1 to 0 or 0 to 1) per second.

47. Reset address of stack pointer in microcontroller 8051 is _____?

Ans. 07H.

48. Hot wire anemometer is used for the measurement of _____?

Ans. Flow measuring device.

49. Indicating instrument shows _____ value of the quantity being measured?

Ans. Instantaneous value.

50. An example of absolute type of instrument is _____?

Ans. Tangent galvanometer.

Q.51 What is air core inductance ?

The inductance that would be measured if the core had unity permeability and the flux distribution remained unaltered. (A measure of the inductance of a coil without a core).

Q.52 Define Humidity.

It is basically moisture content in air or it is the quantity of water vapour retained by gas.

Q.53 Define Hygrometer.

Used to measure the moisture content in air. It also used to measure humidity.

Q.54 What is the basic principle of Hygrometer.

It consist of mechanical device measuring the dimension change of humidity sensitive materials like animal hair, animal membrane , paper etc.

Q.55 Define Moisture.

Defined as the amount of water absorbed by solids or liquids.

Q.56 What is Psychrometer?

Psychrometer is a device that uses the bulb thermometers to measure humidity. It is also used in air conditioning systems for maintaining humidity.

Q.57 What is Ambient Temperature?

The average or mean temperature of the surrounding air which comes in contact with the equipment and instruments under test.

Q.58 Define Boiling Point

The temperature at which a substance in the liquid phase transforms to the gaseous phase; commonly refers to the boiling point of water which is 100°C .

Q.59 What is Maximum Operating Temperature?

The maximum temperature at which an instrument can be safely operated.

Q.60 What is Mean Temperature?

The average of the maximum and minimum temperature of a process equilibrium.

Q.61 What is Negative Temperature Coefficient?

A decrease in resistance with an increase in temperature.

Q.62 What is the purpose of a transistor?

A transistor is a semiconductor device which is commonly used to amplify or switch electronic signals. A transistor is made of a solid piece of a semiconductor material, with at least three terminals for connection to an external circuit. It is used as a switch or a signal amplifier in a circuit.

Q.63 How will you calculate the speed of an induction motor without using tacho meter?

$$\text{Speed} = \text{synch speed} - \left\{ \frac{\text{slip} * \text{synch speed}}{100} \right\}$$

Q.64 In a transistor when base-width decreases with increasing collector to base voltage, this phenomenon is called.....

Early Effect.

Q.65 The internal impedance of an ideal current source is.....

Zero.

Q.66 The condition for reciprocity of a two port network is.....

The answer is $AD - BC = 1$

Q.67 The bridge used for measurement of inductance is.....

Anderson Bridge

Q.68 The type of transmission used for sound in TV transmission is.....

Q.69 What is GPS? How does it work?

Answer GPS, or Global Positioning System, is a satellite-based navigation system. GPS works via a system of satellites and receiving devices used to compute positions on the Earth. The basis of GPS is "triangulation" from satellites. To "triangulate," a GPS receiver measures distance using the travel time of radio signals. To measure travel time, GPS needs very accurate timing which it achieves with some tricks. Along with distance, you need to know exactly where the satellites are in space. High orbits and careful monitoring are the secret. Finally you must correct for any delays the signal experiences as it travels through the atmosphere.

Q.70 What is an advantage and a disadvantage of using sonar? (in comparison to other sensors)

Answer Sonar as used in robots, typically consists of sending out a pulse of sound and listening for the echo. By calculating the time from the initial pulse to the return echo, and knowing the speed of sound, it becomes possible to calculate the distance to the target object. Variants on sonar include changing the frequency of the sound wave generated, and using psuedo random pulse sequences and looking for the range that gives the maximum likelihood response.

Advantages of sonar: Relatively simple sensor, so low cost with easy electronics

An active sensor that gives range to nearest surface

Very good underwater, where nearly every other sensor is not good

Disadvantages: Distance estimates can vary a lot and be quite noisy for a number of reasons

Speed of sound varies as a function of air pressure and temperature.

Ability of sound to travel is also a function of air humidity.

Reflection strength depends upon the properties of the surface and the incidence angle. Multiple reflections are possible.

Cross-talk between multiple sensors is sometimes a problem (they *hear* one another)

Q.71 When the distance between two charges is doubled, the force between them will be equal to

One Fourth

Q.72 What is impedance?

The opposition to the flow of current in an AC circuit

Q.73 What is reactance?

Opposition to the flow of alternating current caused by capacitance or inductance

Q.74 What happens when the impedance of an electrical load is equal to the internal impedance of the power source?

The source can deliver maximum power to the load

Q.75 In order to have the impulse response of a control system apporaching zero with the time tending to infinity

The poles of the system must lie on the L.H.S of the S-plane

Q.76 what is an actuator?

A device that creates automatic motion by converting various forms of energy to rotary or linear mechanical energy. Its a device to convert an electrical **control** signal to a physical action.

Q.77 **How Does a Battery Work?** and How does a battery charge?

Battery has got two leads, one positive and other negative. Electrons gather at the negative terminal of the battery and if you connect a wire across negative to positive, then the electrons from negative end will quickly flow through the wire to the positive terminal. Normally you will have a load connected in the wire which reduces the flow of electrons like a bulb or motor.

Inside the battery itself, a chemical reaction produces the electrons. The speed of electron production by this chemical reaction (the battery's **internal resistance**) controls how many electrons can flow between the terminals. Electrons flow from the battery into a wire, and must travel from the negative to the positive terminal for the chemical reaction to take place.

Q.78 Explain proportional controller with advantages and disadvantages.

Q.79 Explain integral controller with advantages and disadvantages.

Q.80 Explain differential controller with advantage and disadvantages.

Q.81 Explain all the composite mode controllers with advantages and disadvantages.

Q-82 What is difference between circuit and network?

Q-83 What is difference between network analysis and synthesis?

Q-84 Why we study superposition theorem?

Q.85 What are the techniques used for electrical network synthesis.

Q.86 semiconductor materials have _____ temperature coefficient

Ans . negative

Q.87 The Hall effect voltage in intrinsic silicon

Ans. is negative

Q-88 The effect of doping intrinsic semiconductor is to

Ans. move the Fermi level away from the centre of the forbidden band

Q.89 The function of the safety resistor in ohm meter is to

Ans. limit the current in the coil

Q.90. Which transducer converts heat energy into electrical energy

Ans. thermocouple

Q.91 In CRT the focusing anode is located

Ans. between pre accelerating and accelerating anodes

Q.92 Aquadag is used in CRO to collect

Ans. Both primary and secondary electrons

Q.93A device that changes one form of energy to another is called

Ans .transducer

Q.94The electric device which blocks DC but allows AC is called:

Ans. capacitance

Q.95Which of the following electrical equipment cannot convert ac into dc

Ans. rectifier

Q.96 turn on and turn off times of transistor depends on

Ans. junction capacitances

Q.97 the surface dark current of a photodetector depends on

Ans surface defects.

Q.98 a solar cell is a device which uses

Ans photo voltaic effect.

Q99 GaAs led's emit radiation in the

Ans infrared region

Q.100 the wavelength of emitted light in led depends on

Ans. energy gap of the material

Q.101the input Gate current of FET is of the order of

Ans. Negligible

Q.102 the drain source voltage at which drain current becomes constant is called

Ans. pinch off voltage

Q.103 FET'S are basically

Ans . voltage controlled devices.

Q.104 the main current crossing the collector junction in a normally biased npn transistor is

Ans. drift current.

Q.105 which material has the hall coefficient as zero

Ans. insulator

Q.106 reverse saturation current in the germanium diode is of the order of

Ans. 1 micro ampere

Q.107 avalanche breakdown depends on the phenomenon of

Ans. collision

Q.108 zener diode depends on the phenomenon of

Ans. high intensity electric field

Q.109 if the charge concentration varies gradually with the distance in transition region, the junction is said to be

Ans. linearly graded junction

Q.110 Transformer core are laminated for what purpose?

Ans: Reduce eddy current losses

Q.111 Damping torque used in energy meter is produced due to

Ans: eddy currents

Q.112 High frequency transformer core is made up of

Ans: Ferrite

Q.113 The ratio of voltage and electric current in a closed circuit

Ans: remains constant

Q.114 The resistance of a wire varies inversely as

Ans: area of cross section

Q.115 Which material is used for make the 'swamping' resistance that is connected in series with the working coil of a voltmeter?

Ans: Manganin

Q.116 The Frequency is measured by _____ bridge?

Ans: wien's bridge

Q.117 Hays bridge is used to measure _____ and Schering bridge is used to measure _____

Ans: Inductance, Capacitance

Q.118 When sine wave is given as input to Schmitt trigger then its generates

Ans: Square wave

Q.119 In microprocessor the next instruction to be executed is stored in

Ans: Program Counter

Q.120 When the both junction of NPN diode is reverse biased, then the diode is in which mode

Ans. Cut off.

Q.121 How many flip-flops are required to construct Mod -12 counter

Ans: 4

Q.122 which logic gate has the output is compliment of its input -----

Ans: NOT

Q.123 by adding inverters to the inputs and output of a AND gate we can obtain

Ans: X-OR

Q.124 How many NAND gates are needed to realize OR gate..... Answer 3

Q.125 Which logic gate has output high if and only if all inputs are low -----?

Ans: NAND

Q.126 if the output of the gate is always high then the gates applied to this logic are 0,0

Ans: NAND and EX-NOR

Q.127 Thermal Run away is not possible in FET because of the the flow of

Ans : minority carriers.

Q.128 How many NAND gates required to implement $AB+CD+EF$

Ans: 4

Q.129 Transparent latch is seen in which type of flip flop

Ans: D FF

Q.130 Which type of ADC is fastest?

Ans: Flash/Parallel

Q.131 Which one of the following is fastest read/writable memory?

Ans: Flash

Q.132 output resistance of ideal OP AMP is

ANS: 0

Q.133 Si, Ge lie inblock of periodic table

Ans: IV A

134. Efficiency of half wave rectifier

Ans: 45%

1. semiconductor materials have _____ temperature coefficient

Ans . Negative

2. The Hall effect voltage in intrinsic silicon

Ans. is negative

3. the effect of doping intrinsic semiconductor is to

Ans. Move the Fermi level away from the center of the forbidden band

4. beta of a transistor can exceed the value

Ans. 1

5. current flow in a semiconductor depends on the phenomena of

Ans. Drift, diffusion, recombination

6. In measurements made using a Q meter, high impedance elements should preferably be connected in

Ans. Series

8. The dielectric loss of a capacitance can be measured by

Ans. Schering Bridge

9 The function of the safety resistor in ohm meter is to

Ans. limit the current in the coil

10. Which transducer converts heat energy into electrical energy?

Ans. Thermocouple

11. In CRT the focusing anode is located

Ans. between pre accelerating and accelerating anodes

12 Thermocouples are

Ans. active transducers

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Ans. Both primary and secondary electrons

14) A device that changes one form of energy to another is called

Ans .transducer

15) The electric device which blocks DC but allows AC is called:

Ans. Capacitance

16) Which of the following electrical equipment cannot convert ac into DC?

Ans. Rectifier

17) Turn on and turn off times of transistor depends on

Ans. Junction capacitances

18 TRIAC cannot be used in

Ans. Solid state type of switch.

19) A thyristor controlled reactor is used to get

Ans improved reactive power factor

20) TRIAC cannot be used in AC voltage regulator for a

Ans inductive load

21) The surface dark current of a photo detector depends on

Ans surface defects.

22) A solar cell is a device which uses

Ans. Photo Voltaic Effect.

23) GaAs LEDs emit radiation in the

Ans. infrared region

24) The wavelength of emitted light in led depends on

Ans. Energy gap of the material

25) The input Gate current of FET is of the order of

Ans. Negligible

26) The drain source voltage at which drain current becomes constant is called

Ans. Pinch off voltage

27) FET'S are basically

Ans . Voltage controlled devices.

28) the main current crossing the collector junction in a normally biased npn transistor is

Ans. Drift current.

29) Early effect in bjt refers to

Ans . Base narrowing

30) NaCl is example of ?

Ans. ionic solid

31) Which materials do not have a covalent bond?

Ans. Metal

32) In an intrinsic semiconductor, no. of electrons is equal to no. of holes at which temperature

Ans. 0 kelvins

33) Donor impurity for silicon is

Ans. Arsenic

34) The mean free path for electron drift increases with

Ans. Purity

35) Which material has the hall coefficient as zero

Ans. Insulator

36) In a PN junction without biasing the p side is

Ans. Negatively charged

37) Reverse saturation current in the germanium diode is of the order of

Ans. 1 micro ampere

38) Avalanche break down depends on the phenomenon of

Ans. Collision

39) Zener diode depends on the phenomenon of

Ans. High intensity electric field

40) If the charge concentration varies gradually with the distance in transition region, the junction is said to be

Ans. Linearly graded junction.

Q.1 n-type silicon is obtained by

- (A) Doping with tetravalent element
- (B) Doping with pentavalent element
- (C) Doping with trivalent element
- (D) Doping with a mixture of trivalent and tetravalent element

Q.2 The forward characteristic of a diode has a slope of approximately 50mA/V at a desired point. The approximate incremental resistance of the diode is

- (A) 50 Ω
- (B) 35 Ω
- (C) 20 Ω
- (D) 10 Ω

Q.3 Two stages of BJT amplifiers are cascaded by RC coupling. The voltage gain of the first stage is 10 and that of the second stage is 20. The overall gain of the coupled amplifier is

- (A) 10x20
- (B) 10+20
- (C) (10+20)²
- (D) (10x20)/2

Q.4 In the voltage range, $V_p < V_{DS} < BV_{DSS}$ of an ideal JFET or MOSFET

- (A) The drain current varies linearly with V_{DS} .
- (B) The drain current is constant.
- (C) The drain current varies nonlinearly with V_{DS} .
- (D) The drain current is cut off.

Q.5 In a voltage shunt negative feedback amplifier system, the input resistance R_i and the output resistance R_o of the basic amplifier are modified as follows:

- (A) R_i is decreased and R_o increased.
- (B) Both R_i and R_o are decreased.
- (C) Both R_i and R_o are increased
- (D) R_i is increased and R_o is decreased.

Q.6 The use of crystal in a tunable oscillator

- (A) Improves frequency stability.
- (B) Increases the gain of the oscillator.
- (C) Helps to obtain optimum output impedance.
- (D) Facilitates generation of wide range of frequencies.

Q.7 The large signal bandwidth of an opamp is limited by its

- (A) Loop gain
- (B) slew rate
- (C) output impedance
- (D) input frequency

Q.8 Rectification efficiency of a full wave rectifier without filter is nearly equal to

- (A) 51%
- (B) 61%
- (C) 71%
- (D) 81%

Q.9 When the temperature of a doped semiconductor is increased, its conductivity

- (A) decreases.
- (B) increases.
- (C) does not change.
- (D) increases or decreases depending on whether it is p- or n-type.

Q.10 The main characteristics of a Darlington Amplifier are

- (A) High input impedance, high output impedance and high current gain.
- (B) Low input impedance, low output impedance and low voltage gain.
- (C) High input impedance, low output impedance and high current gain.
- (D) Low input impedance, low output impedance and high current gain.

Q.11 The transconductance, g_m , of a JFET is computed at constant V_{DS} , by the following:

- (A) $\Delta I_D / \Delta V_{GS}$
- (B) $\Delta V_{GS} / \Delta I_D$
- (C) $\Delta V_{GS} \times \Delta I_D$
- (D) $\Delta I_D / (\Delta V_{GS} + \Delta I_{DS})$

Q.12 The feedback factor β at the frequency of oscillation of a Wien bridge oscillator is

- (A) 3
- (B) 1/3
- (C) 1/29
- (D) -(3/29)

Q.13 In an amplifier with negative feedback, the bandwidth is

- (A) increased by a factor of β
- (B) decreased by a factor of β
- (C) increased by a factor of $(1+A\beta)$
- (D) not affected at all by the feedback where A = gain of the basic amplifier and β = feedback factor

- Q.27** If the peak value of the input voltage to a half wave rectifier is 28.28 volts and no filter is use, the maximum dc voltage across the load will be
 (A) 20 $\sqrt{2}$ V. (B) 15 V.
 (C) 9 V. (D) 14.14 V.
- Q.28** The logic gate which detects equality of two bits is
 (A) EX-OR (B) EX-NOR
 (C) NOR (D) NAND
- Q.29** The electron relaxation time of metal A is 2.7×10^{-4} s, that of B is 1.35×10^{-4} s. The ratio of resistivity of B to resistivity of A will be
 (A) 4 (B) 2.0
 (C) 0.5 (D) 0.25
- Q.30** The overall bandwidth of two identical voltage amplifiers connected in cascade will
 (A) Remain the same as that of a single stage. (D) Be better if stage gain is low and worse if stage gain is high.
 (B) Be worse than that of a single stage.
 (C) Be better than that of a single stage.
- Q.31** Field effect transistor has
 (A) large input impedance. (B) large output impedance.
 (C) large power gain. (D) large votage gain.
- Q.32** Which of the following parameters is used for distinguishing between a small signal and a large-signal amplifier?
 (A) Voltage gain (B) Frequency response
 (C) Harmonic Distortion (D) Input/output impedances
- Q.33** Which of the following parameters is used for distinguishing between a small signal and a large-signal amplifier?
 (A) Instability (B) Bandwidth
 (C) Overall gain (D) Distortion
- Q.34** If the feedback signal is returned to the input in series with the applied voltage, the input impedance _____.
 (A) decreases (B) increases
 (C) does not change (D) becomes infinity
- Q.35** Most of linear ICs are based on the two transistor differential amplifier because of its
 (A) input voltage dependent linear transfer characteristic. (C) High input resistance.
 (B) High voltage gain. (D) High CMRR
- Q.36** A single phase diode bridge rectifier supplies a highly inductive load. The load current can be assumed to be ripple free. The ac supply side current waveform will be
 (A) sinusoidal (B) constant dc.
 (C) square (D) triangular
- Q.37** Which of the following Boolean rules is correct?
 (A) $A + 0 = 0$ (B) $A + 1 = 1$
 (C) $A + \bar{A} = A.A$ (D) $A + AB = A + \bar{A}B$
- Q.38** A single phase diode bridge rectifier supplies a highly inductive load. The load current can be assumed to be ripple free. The ac supply side current waveform will be
 (A) sinusoidal (B) constant dc.
 (C) square (D) triangular
- Q.49** The temperature control system in the human body is an example of a closed-loop control system.
 A) True B) False
- Q.40** In a temperature control system, what represents the output of the system?
 A) The required temperature. B) The actual temperature achieved.
 C) The heat produced by the system. D) The heating element.

type conductivity.

2. Ans: (C)

Resistance at any point in the forward characteristics is given by $R = \frac{V}{I} = \frac{1}{50\text{mA}} = 20__$

3. Ans: (A)

The voltage gain of a multistage amplifier is equal to the product of the gains of the individual stages.

4. Ans: (B)

It is the saturation region or pinch off region, and drain current remains almost constant at its maximum value, provided VGS is kept constant.

5. Ans: (B)

Here, a fraction of output voltage obtained by parallel sampling is applied in parallel with the input voltage through feedback and both input and output resistance decrease by a factor equal to $(1 + A_v)$.

6. Ans: (A)

Piezoelectric crystal is used as a resonant tank circuit. The crystal is made of quartz material and provides a high degree of frequency stability.

7. Ans: (B)

8. Ans: (D)

Efficiency of a full wave rectifier is given by $\frac{[(2I_m / \sqrt{2})^2 \times R_L]}{[(I_m / \sqrt{2})^2 \times (R_f + R_L)]} = 81\%$, when R_g is zero.

9. Ans: B

10. Ans: C

11. Ans: A

12. Ans: A

13. Ans: C

14. Ans: D

15. Ans: B

16. Ans: D

17. Ans: D

18. Ans: D

19. Ans: D

20. Ans: B

21. Ans:

22. Ans: C

23. Ans: A

24. Ans: D

25. Ans: A

26. Ans: B

27. Ans: C

28. Ans: B

29. Ans: B

30. Ans: B

31. Ans: A

32. Ans: D

33. Ans: B

34. Ans: B

35. Ans: D

36. Ans: C

37. Ans: B

38. Ans: C

Bold option is the answer

1. An ideal op-amp is an ideal

- A) voltage controlled current source
- B) voltage controlled voltage source**
- C) current controlled current source
- D) current controlled voltage source

2 The Fourier transform of a conjugate symmetric function is always

- A) imaginary
- B) conjugate anti-symmetric
- C) real**
- D) conjugate symmetric

3 The Q – meter works on the principle of

- A) mutual inductance
- B) self inductance
- C) series resonance**
- D) parallel resonance

4 In relation to the synchronous machines, which one of the following statements is false?

- A) In salient pole machines, the direct-axis synchronous reactance is greater than the quadrature-axis synchronous reactance
- B) The damper bars help the synchronous motor self start
- C) Short circuit ratio is the ratio of the field current required to produce the rated voltage on open circuit to the rated armature current**
- D) The V-curve of a synchronous motor represents the variation in the armature current with field excitation, at a given output power

5 The 8085 assembly language instruction that stores the content of H and L registers into the memory locations 2050H and 2051H, respectively, is

- A) SPHL 2050H
- B) SPHL2051H
- C) SHLD 2050H**
- D) STAX 2050H

6 The conduction loss versus device current characteristic of a power MOSFET is best approximated by

- A) a parabola**
- B) a straight line
- C) a rectangular hyperbola
- D) an exponentially decaying function

7 High Voltage DC (HVDC) transmission is mainly used for

- A) bulk power transmission over very long distances**
- B) inter-connecting two systems with the same nominal frequency
- C) eliminating reactive power requirement in the operation
- D) minimizing harmonics at the converter stations

8 For the equation, $s^3 - 4s^2 + s + 6 = 0$ the number of roots in the left half of s-plane will be

- A) 0
- B) 1
- C) 2**
- D) 3

9 A master-slave flip-flop has the characteristic that

- A) change in the input immediately reflected in the output
- B) change in the output occurs when the state of the master is affected
- C) change in the output occurs when the state of the slave is affected**
- D) both the master and the slave states are affected at the same time

10 The cascade amplifier is a multistage configuration of

- A) CC-CB
- B) CE-CB**
- C) CB-CC
- D) CE-CC

11 The bandgap of Silicon at room temperature is

- A) 1.3 eV
- B) 0.7 eV
- C) 1.1 eV**
- D) 1.4 eV

12 In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by the factor

- A) 8/6
- B) 12
- C) 16**
- D) 8

13 For the polynomial $P(s) = s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15$, the number of roots which lie in the right half of the s-plane is

- A) 4
- B) 2**
- C) 3
- D) 1

14 Express the decimal number 57 in binary.

- A) 100101
- B) 111010
- C) 110010
- D) 111001**

15 Noise with uniform power spectral density of N_0 W/Hz is passed through a filter $H(\omega) = 2 \exp(-j\omega t_d)$ followed by an ideal low pass filter of bandwidth B Hz. The output noise power in Watts is

- A) $2N_0B$
- B) $4N_0B$**
- C) eN_0B
- D) $16 N_0B$

16 What is the primary function of multiplexing?

- A) To match the frequency range of a signal to a particular channel.
- B) To reduce the bandwidth of a signal.
- C) To select one radio channel from a wide range of transmitted channels.
- D) To allow a number of signals to make use of a single communications channel.**

17 A second step to further increase system capacity is a digital access method called TDMA (Time Division Multiple Access). Using the same frequency channelization and reuse as FDMA analog but adding a time sharing element, the effective capacity is:

- A) Doubled
- B) Tripled
- C) Reduced by one third
- D) Unchanged**

18 An op-amp integrator has a square-wave input. The output should be

- A) a sine wave.
- B) a triangle wave**
- C) a square wave.
- D) pure DC.

19 At an industrial sub-station with a 4 MW load, a capacitor of 2 MVAR is installed to maintain the load power factor at 0.97 lagging. If the capacitor goes out of service, the load power factor becomes

- A) 0.85
- B) 1.00
- C) 0.80 lag**
- D) 0.90 lag

20 Consider a lossless antenna with a directive gain of +6dB. If 1 mW of power is fed to it the total power radiated by the antenna will be

- A) 4 mW**
- B) 1 mW
- C) 7 mW
- D) 1/4 mW

21 The drain of an n-channel MOSFET is shorted to the gate so that $V_{GS} = V_{DS}$. The threshold voltage (V_T) of MOSFET is 1 V. If the drain current (I_D) is 1 mA for $V_{GS} = 2V$, then for $V_{GS} = 3V$, I_D is

- A) 2 mA
- B) 3 mA
- C) 9 mA
- D) 4 mA**

22 The first and the last critical frequency of an RC-driving point impedance function must respectively be

- A) a zero and a pole
- B) a zero and a zero
- C) a pole and a pole
- D) a pole and a zero**

23 A digital-to-analog converter with a full-scale output voltage of 3.5 V has a resolution close to 14m V. Its bit size is

- A) 4
- B) 8**
- C) 16
- D) 32

24 The phase velocity of an electromagnetic wave propagating in a hollow metallic rectangular waveguide in the TE₁₀ mode is

- A) equal to its group velocity
- B) less than the velocity of light in free space
- C) equal to the velocity of light in free space
- D) greater than the velocity of light in free space**

25 A device with input $x(t)$ and output $y(t)$ is characterized by: $y(t) = x^2(t)$. An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to this device. The bandwidth of the output signal is

- A) 370 kHz
- B) 190 kHz
- C) 380kHz**
- D) 95kHz

26 An op-amp integrator has a triangle-wave input. The output should be

- A) a sine wave.
- B) a triangle wave
- C) a square wave.
- D) pure DC.

27 What frequency range is the High Frequency band?

- 1) 100 kHz
- 2) 1 GHz
- 3) 30 to 300 MHz**
- 4) 3 to 30 MHz

28 How many loud speakers are required in a quadraphonic?

- (a) Two (b) Three (c) **Four** (d) Six

29 What does EPROM stand for?

- 1) Electric Programmable Read Only Memory
- 2) Erasable Programmable Read Only Memory**
- 3) Evaluable Philotic Random Optic Memory
- 4) Every Person Requires One Mind

30 What does the term PLC stand for?

- 1) Programmable Lift Computer
- 2) Program List Control
- 3) Programmable Logic Controller**
- 4) Piezo Lamp Connector

17. In a synchro error detector, the output voltage is proportional to $[w(t)]^n$ where $w(t)$ is the rotor velocity and n equals

- (a) - 2 (b) - 1 (c) **1** (d) 2

32 Sometimes computers and cash registers in a foodmart are connected to a UPS system. What does UPS mean?

- 1) United Parcel Service
- 2) Uniform Product Support
- 3) Under Paneling Storage
- 4) Uninterruptable Power Supply**

33 What does AC and DC stand for in the electrical field?

- 1) Alternating Current and Direct Current**
- 2) A Rock Band from Australia
- 3) Average Current and Discharged Capacitor
- 4) Atlantic City and District of Columbia

34 Which consists of two plates separated by a dielectric and can store a charge?

- 1) Inductor
- 2) Capacitor**
- 3) Transistor
- 4) Relay

9 A 800 kV transmission line is having per phase line inductance of 1.1 mH/km and per phase line capacitance of 11.68 nF/km. Ignoring the length of the line, its ideal power transfer capability in MW is

- A) 1204 MW
- B) 1504 MW
- C) 2085 MW**
- D) 2606 MW

36 The FFT, a mathematical process, is used extensively in digital signal processing (DSP). For what word does the second "F" in FFT stand?

- 1)Fast**
- 2) Fourier
- 3) Ford
- 4) Footed

37 Which is a type of Electrically-Erasable Programmable Read-Only Memory?

- 1) Flash**
- 2) Flange
- 3) Fury
- 4) FRAM

38 A given signal's second harmonic is twice the given signal's _____ frequency...?

- 1) Fourier
- 2) Foundation
- 3) Fundamental**
- 4) Field

39 In a piezoelectric crystal oscillator, the oscillation or tuning frequency is linearly proportional to the

- (a) mass of the crystal
- (b) square root of the mass of the crystal
- (c) square of the mass of the crystal
- (d) inverse of the square root of the mass of the crystal**

40 The operating state that distinguishes a silicon controlled rectifier (SCR) from a diode is

- (a) forward conduction state
- (b) forward blocking state**
- (c) reverse conduction state
- (d) reverse blocking state

41 The number of comparators needed in a parallel conversion type 8-bit A to D converter is

(a) 8 (b) 16 (c) 255 (d) 256

42 An integrating digital voltmeter measure

(a) true average value (b) rms value (c) **peak value** (li) peak to peak value

43 The impulse response of on R-L circuits is a

(a) **rising exponential function** (b) decaying exponential function (c) step function (li) parabolic function

44 In a modulation system, on doubling the modulation frequency, the modulation index gets halved while the modulating voltage needed remains unaltered. The modulation system is

(a) AM (b) **FM** (c) PM (d) All the above

45. A signed integer has been stored in a byte using the 2's complement format. We wish to store the same integer in a 16 bit word. We should

(a) copy the original byte to the less significant byte of the word and fill the more significant with zeros

(b) copy the original byte to the more significant byte of the word and fill the less significant byte with zeros

(c) **copy the original byte to the less significant byte of the word and make each bit of the more significant byte equal to the most significant bit of the original byte**

(d) copy the original byte to the less significant byte as well as the more significant byte of the word

46 Flat top sampling of low pass signals

(a) **gives rise to aperture effect** (b) implies over sampling (e) leads to aliasing (d) introduces delay distortion

47 A half wave rectifier uses a diode with a forward resistance R_f . The voltage is $V_m \sin \omega t$ and the load resistance is R_L . The DC current is given by

(a) $V_m/\sqrt{2R_L}$ (b) **$V_m/\pi * (R_r + R_L)$**

(e) $2V_m/\sqrt{\pi}$ (d) V_m/R_L

48 If carrier modulated by a digital bit stream had one of the possible phases of 0, 90, 180, and 270 degrees, then the modulation is called

(a) BPSK (b) **QPSK** (c) QAM (d) MSK

49 The Maxwell equation is

(a) **Ampere's law**

(e) Faraday's law

(b) Gauss low

(d) Coulomb's law

50 The probability density function of the envelope of narrow band Gaussian noise is

(a) **Poisson**

(e) Rayleigh

(b) Gaussian

(d) none of these

1. List any four objectives of process control.

Suppressing the influence of external disturbances, Optimizing the performance, Increasing the productivity, Cost effective.

2. Define process

Any system comprised of dynamic variables usually involved in manufacturing and production operations. It is defined as a series of operations during which some materials are placed in more useful state.

3. What is manipulated variable

It is a variable which is altered by the automatic control equipment so as to change the variable under and make it conform with the desired value.

4. Define Controlled variable

It is the quantity of control system which is directly measured and controlled.

5. What do you mean by self regulation?

The output will move from one steady state to another for the sustained change in input. This means that for change in some input variable the output variable will rise until it reaches a steady state (inflow = outflow). It is the

tendency of the process to adopt a specific value of controlled variable for nominal load with no control operations.

6. Why do we need mathematical modeling of process?

The physical equipment of the chemical process we want to control have not been constructed. Consequently we cannot experiment to determine how the process reacts to various inputs and therefore we cannot design the appropriate control system. If the process equipment needs to be available for experimentation the procedure is costly. Therefore we need a simple description of how the process reacts to various inputs, and this is what the mathematical models can provide to the control designer.

7. Name different test inputs.

Step, Ramp, Impulse, Sinusoidal, Pulse inputs

8. Name a process giving inverse response.

Drum boiler system, in which the flow rate of the cold feed water is increased by a step the total volume of the boiling water and consequently the liquid level will decreased for a short period and then it will start increasing.

9. Define interacting system and give an example.

Load changes in first process affects the second process and vice versa when both are connected in series nature is called interacting system. Eg. Two level tanks are connected in series.

10. A tank operating at 10ft head, 51pm outflow through a valve and has a cross section area of 10 sq ft. calculate the time constant.

$$T=R/A, R=H/Q=10/(5 \times 5.885 \times 10^{-4})$$

11. What is meant by non-self regulation?

A system that grows without limit for a sustained change in input (constant outflow or outflow independent of inflow condition).

12. Write any two characteristics of first order process modeling.

The smaller the value of time constant the steeper the initial response of the system. A first order lag process is self regulating the ultimate value of the response equal to K_p (steady state gain of the process) for a unit step change in the input.

13. Distinguish between continuous process and batch process.

A process in which the materials or work flows more or less continuously through a plant apparatus while being treated is termed as continuous process. The problem of continuous process is due to load changes. (e.g.) storage vessel control.

A process in which the materials or work are stationary at one physical location while being treated is termed as batch process. (e.g.) furnace.

14. Explain the function of controller.

The element in a process control loop that evaluated error of the controlled variable and initiates corrective action by a signal to the controlling variable.

15. What is the purpose of final control element?

Components of a control system (such as valve) is used to directly regulates the flow of energy or materials to the process. It directly determines the value of manipulated variable.

16. Define Process control.

It is the scheme that describes how much the manipulated variable should change in order to bring the controlled variable back to the setpoint.

17. List the two types of process control.

Direct process control – Controlled variable directly indicates the performance of the process

Eg. Water heater system

Indirect Process control – Controlled variable indirectly indicates the performance of the process.

Eg. Annealing

18. What is Servo operation and Regulatory operation.

If the purpose of the control system is to make the process follow the changes in setpoint as quick as possible, then it is servo operation.

19. What is mathematical modeling.

Set of equations that characterize the process is termed as Mathematical Modelling.

20. Define a non-interacting system.

The dynamic behaviour one tank is affected by the other, but the reverse is not true, then it is a non-interacting system. Here the liquid heads are independent of each other.

21. Define an interacting system.

The dynamic behavior one tank is affected by the other, but the reverse is also true, then it is non-interacting system. Here the liquid heads are dependent of each other.

22. Mention two drawbacks of derivative action.

- (i) The output of controller is zero at constant error condition.
- (ii) It will amplify the noise present in the error signal.

23. What are the steps involved to design a best controller?

Define appropriate performance criterion (ISE, IAE, ITATE). Compute the value of the performance criterion using a P, PI, or PID controller with the best setting for the adjusted parameters K_p , T_i , T_d . Select controller which give the best value for the performance criterion.

24. Define proportional control mode

A controller mode in which the controller output is directly proportional to the error signal $P=K_p e_p+p_0$ P-controller output $K_p=$ Propotional gain, $e_p=$ error in percent of variable range, $P_0=$ Bias.

25. Define proportional band.

Proportional band is defined as the change in input of proportional controller mode required to produce a full-scale change in output

26. Write the relation ship between proportional band and proportional gain.

The reciprocal of gain expressed as a percentage is called proportional band. $K_p=100/PB$

27. Define offset.

It is the steady state deviation (error) resulting from a change in value of load variable.

28. Define error (deviation)?

It is the difference at any instant between the value of controlled variable and the set point. $E=S.P-P.V$

29. Sketch Pneumatic P+I controller.

Refer Curtis Johnson, Page No.418, and Fig. 10.17.

30. Why is the electronic controller preferred to pneumatic controller?

Electronic signals operate over great distance without time lags. Electronic signals can be made compatible with digital controllers. Electronic devices can be designed to be essentially maintenance free. Intrinsic safety techniques eliminate electrical hazards. Less expensive to install. More energy efficient. Due to the above said properties electronic controllers are preferred to pneumatic controller.

31. Explain the function of controller.

The element in process control loop that evaluates error of the controlled variable and initiates corrective action by a signal to the controlling variable.

32. Write any two limitations of single speed floating control.

The present output depends on the time history of errors and such history is not known, the actual value of controller output floats at an undetermined value. If

the deviation persists controller saturates at either 100% or 0% and remain there until an error drives it towards opposite extreme.

33. Sketch the input – output characteristic of single – speed floating controller.

Refer Curtis Johnson, Page No. 368, and Fig.9.7.

34. Why derivative mode of control is not recommended for a noisy process?

The series capacitor in the derivative controller will amplify the noise in the error signal.

35. Define integral (reset) windup?

The over charging in the presence of a continuous error of the integral capacitor which must discharge through a long time constant discharge path and which prevents a quick return to the desired control point.

36. What are the two modes of controller.

Discontinuous and continuous mode are the two modes of controller.

37. Define Discontinuous mode of controller.

If for only two values of error, control action is taken, it is Discontinuous mode of controller.

38. Define Continuous mode of controller.

If for every value of error, control action is taken, it is Discontinuous mode of controller.

39. Give an example for Discontinuous and Continuous mode of controller.

Discontinuous-ON-OFF controller.

Continuous – Proportional Controller

40. Define cycling.

Oscillations of error about zero is called cycling.

42. Define controller turning.

Deciding what values to be used for the adjusted parameters of the controller is called controller turning.

43. What is reaction curve.

In process controller, the reaction curve is obtained by applying a step change (either in load or in set point) and plotting the response of the controlled variable with respect to time.

44. What performance criterion should be used for the selection and turning of controller?

Keep the maximum error as small as possible.

Achieve short settling time.

Minimize the integral of the errors until the process has settled set Point.

45. Define ultimate gain.

The maximum gain of the proportional controller at which the sustained oscillations occur is called ultimate gain (K_u).

46. What is ITAE and when to go for it?

ITAE means Integral Time Absolute Error. To suppress the errors that persist for long time, the ITAE criterion will tune the controllers better because the presence of large t amplifies the effect of even small errors in the value of integral.

47. What are the parameters required to design a best controller?

Process Parameters (K, τ), Controller parameters (K_p, T_i, T_d), performance criterion (ISE, IAE, IATE)

48. Write any two practical significance of the gain margin.

It constitutes a measure of how far the system is the brink of instability.

Higher the gain margin (above the value of one), the higher the safety factor we use controller tuning.

Typically, a control designer synthesizes a feedback system with gain margin larger than 180°.

49. Why is it necessary to choose controller settings that satisfy both gain margin and phase margin?

The gain margin and Phase margin are the safety factors which is used for the design of a feedback system. Beyond the phase margin and gain margin the system goes to unstable position.

50. What is turning a controller based on quarter – decay ratio?

It is the procedure in which adjusting the proportional gain of controller upto $\frac{1}{4}$ th decay ratio waveform is obtained.

51. Name the time integral performance criteria measures.

Integral Square Error (ISE), Integral of absolute value of error (IAE), Integral of time weighted absolute error.

52. Define Integral Square Errors (ISE)

If we want to suppress large errors, ISE is better than IAE Because errors are squared and contribute more to the value of integral.

53. Define Integral Absolute Errors (IAE)

If we want to suppress small errors, IAE is better than ISE Because when we square small numbers, they even become smaller.

54. Define Integral of Time weighted Absolute Error (ITAE)

To suppress errors that persist for long times, ITAE criterion will tune the controllers better because the presence of large t amplifies the effect of even small errors in value of integral.

55. Define One-quarter decay ratio.

It is reasonable trade off between fast rise time and reasonable setting time.

56. Give the satisfactory control for gas liquid level process.

Proportional Control is the satisfactory control for liquid level process.

57. Give the satisfactory control for gas pressure process.

Proportional Control is the satisfactory control for liquid level process.

58. Give the satisfactory control for vapour pressure process.

PI Control is the satisfactory control for vapour pressure process having fast response.

59. Give the satisfactory control for temperature process.

PID Control is the satisfactory control for temperature process.

60. Give the satisfactory control for composition process.

PID Control is the satisfactory control for composition process.

61. Define ratio control.

Ratio control is a special type of feed forward control where two disturbances are measured and held in a ratio to each other.

62. Define cascade control.

Cascade control is defined as a control system composed of two loops where the set point of one loop (the inner loop) is the output of the controller of the other loop (the outer loop)

63. When cascade control will give improved performance than conventional feedback control?

In some process the secondary variables in it introduce disturbance throughout the system is measured and controlled by a separate loop.

64. Explain the purpose of cascade control for heat exchangers?

In heat exchangers, the control objective is to keep the exit temperature of stream. But the flow rate of the stream creates the low disturbance throughout of its a function. The secondary loop is used to compensate the flow rate of the stream.

65. What is meant by auctioneering control?

Such control configurations select among several measurements the one with the highest value and feed it to the controller. Thus it is a selective controller which possesses several measured outputs and only one manipulated input.

66. Give any two types of selective control system.

Override control for the protection of process equipment, auctioneering control.

67. What is limit switch?

In some cases it is necessary to change from the normal control action and attempt to prevent a process variable from exceeding an allowable upper or lower limit. This can be achieved by the use of special type switches called limit switches.

68. Mention the types of limit switches.

High Select Switch (HSS), Low Select Switch (LSS).

69. What is HSS?

High Select Switch (HSS) is a limit switch which is used whenever a variable should not exceed an upper limit.

70. What is LSS?

Low Select Switch (LSS) is a limit switch which is used whenever a variable should not exceed an lower limit.

71. What is override control?

During the operation of the plant, it is possible that some of the process variables exceed the limit. In such cases it is necessary to change from the normal control action and attempt to prevent a process variable from exceeding an allowable an allowable upper or lower limit. This can be achieved by the use of special type switches called limit switches called limit switches (HSS and LSS). This type of protective control is called override control.

72. What is split-range control?

To control A single process output can be controlled by co-coordinating the actions of several manipulated variables all of which have same effect on controlled output. Such systems are called split-range control systems.

73. Differentiate split-range control and selective control.

Split-range control system involves one measurement and more than one manipulated variables but selective control system involves one manipulated variables and several controlled outputs.

74. Why are fuel and air sent at a specified ratio into a combustion chamber?

To obtain the most efficient combustion.

75. What are decouplers?

The special element introduced in a system with two strongly interacting loops to cancel the interaction effect between the two loops and thus render two non-interacting control loops is called decoupler.

76. When is inferential control used?

It is used in some cases where the output of the process and the influence of the disturbance cannot be measured.

77. What are the advantages of feedforward controller.

Acts before the disturbance is felt by the process. It is good for slow systems.

78. What are the disadvantages of feedforward controller.

Requires identification of all possible disturbances and their direct impact.
Cannot cope with unmeasured disturbances.

79. What are the advantages of feedback controller.

It does not require identification and measurement of disturbance.

80. What are the disadvantages of feedforward controller.

It is unsatisfactory for slow processes with significant dead time.

81. What is flashing in control valve?

When a liquid enters a valve and the static pressure at the vena contracta less than the fluid vapour pressure and the valve outlet pressure is also less than the fluid vapour pressure the condition called flashing exists.

82. When do you use a valve positioner?

If the diaphragm actuator does not supply sufficient force to position the valve accurately and overcome any opposition that flowing conditions create a positioner may be required.

83. Give two examples for electric actuators.

Motor, Solenoids.

84. What is the need of I/P converter in a control system?

In some process loop the controller is electronic and the final control element is electronic one. To interconnect these two we need a device that should linearly converts electric current in to gas pressure (4-20mA-315 psi). such device is called I/P converter.

85. Why installed characteristics of a control valve is different from inherent characteristics?

Inherent characteristics is which the valve exhibits in the laboratory condition where the pressure drop is held constant. Installed or resultant characteristics is the relationship between flow and stroke when the valve is subjected to pressure conditions of the process.

86. Explain the function of pneumatic transmission lines.

Used to transmit the input signals into standard instrumentation pneumatic output signals (3 to 15 psi or 20 to 100 KPa).

87. What is the purpose of final control element.

Components of a control system (such as valve) is used to directly regulates the flow of energy or materials to the process. It directly determines the value of manipulated variable.

88. What is meant by cavitations in control valve?

When a liquid enters a valve and the static pressure at the vena contracta drops to less than the fluid vapor pressure and the recovering to above fluid vapour pressure, this pressure recovery causes an implosion or collapse of the vapour bubbles formed at the vena contracta. This condition is called cavitation.

89. What is “equal percentage” in the equal percentage valve?

For equal increment of stem travel at constant pressure drop an equal percentage change in existing flow occurs.

90. What are the characteristics of control valve?

Inherent characteristics, Installed characteristics.

91. Differentiate inherent characteristics and installed characteristics.

Inherent characteristics is which the valve exhibits in the laboratory condition where the pressure drop is held constant. Installed or resultant characteristics is the relationship between flow and stroke when the valve is subjected to pressure conditions of the process.

92. What is “quack opening” control valve.

For smaller movement of the stem, there is maximum flow rate.

93. What is “Linear” control valve.

If stem position varies linearly with flow rate, then it is linear.

94. Define Control Valve sizing.

$$Q=Cv.\text{sqrt}(P/Sg)$$

Q-Flow rate

Cv-Valve coefficient

P-pressure difference across valve.

Sg-Specific gravity of liquid.

95. Name any one final control element.

Control Valve.

96. What is the function of control valve in a flow control system.

The function of control valve in flow control system is to regulate the flow.

97. Name one application of electrical actuators.

Solenoid coil used to change gears.

98. Name the two types of plugs.

Single-seated and double-seated plug type control valves.

99. Define Rangeability.

It is the ratio of maximum controllable flow to minimum controllable flow.

100. What is rotating shaft type control valves.

1. Rotating-plug valves
2. Butterfly valves
3. Louvers.

