Trade Theory(2nd Year)

Multiple Choice Practice Questions for ONLINE/OMR AITT-2020 INSTRUMENT MECHANIC

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FUNDAMENTALS OF MEASUREMENT SYSTEM & INSTRUMENTATION

1. The desirable Static characteristic of a measuring system are :
   (a) Accuracy & Reproducibility
   (b) Accuracy , Sensitivity & Reproducibility
   (c) Drift & Dead zone
   (d) Static Error

2. The ratio of maximum displacement deviation to full scale deviation of the instrument is called :
   (a) Static sensitivity (c) Linearity
   (b) Dynamic Deviation (d) Precision or Accuracy

3. The ability to give same output reading when same input value is applied repeatedly is known as
   (a) Stability (c) Accuracy
   (b) Repeatability (d) Sensitivity

4. The study of relationship between the input and output, then the input is invariant with respect to time is called as,
   (a) Static Characteristic of an instrument
   (b) Dynamic Characteristic of an Instrument
   (c) Variable Characteristics of an Instrument
   (d) None of the above

5. Change in output of sensor with change in input of sensor is :
   (a) Threshold (c) Sensitivity
   (b) Slew Rate (d) None of the above
6. Smallest change in which a sensor can detect ,
   (a) Resolution (c) Precision
   (b) Accuracy (d) Scale

7. Closeness of measured value to true value is _____
   (a) Accuracy (c) Correction
   (b) Precision (d) Uncertainty
8. What is the term used to express the ability of a measuring system to maintain its standard performance?
   (a) “0” Stability (c) Sensitivity
   (b) Stability (d) Linearity

9. Which of the following is caused by careless handling ?
   (a) Systematic Error (c) Random Error
   (b) Gross Error (d) None of the above

10. Which of the following is not a Fundamental Quantity?
    (a) Length (c) Time
    (b) Angle (d) Luminous Intensity

11. Which of the following error is caused by poor calibration of the instrument?
    (a) Random Error (c) Systematic Error
    (b) Gross Error (d) Precision Error
12. Which of the following represents an SI Unit of Luminous Intensity?
    (a) Lumen (c) Dioptre
    (b) Candela (d) None of the above

13. The region in which the output doesn’t change with increase in input is called :

(a) Input Range (c) Offset
(b) Threshold (d) Saturation

14. The range between a maximum and a minimum values is applied to a parameter which can be measured is
(a) Repeatability (c) Input Range
(b) Span (d) Output Range

15. The minimum input of physical parameter that will create a detectable out change is called
(a) Threshold (c) Span
(b) Sensitivity (d) Precision

16. The total operating range of the transducer is called _____
(a) Span (c) Offset
(b) Threshold (d) Drift
17. Which of the following is not a static property ?
(a) Repeatability (c) Frequency response
(b) Hysteresis (d) Saturation
18. Which of the following is not a dynamic Characteristic?
(a) Frequency Response (c) Settling Time
(b) Saturation (d) Response time
19. The undesirable Characteristics of a measuring system is _____
(a) Drift (c) Non Linearity
(b) Dead zone (d) All of these

20. If the instrument is used in wrong manner while application , then it will results in _____
(a) Systematic Error (c) Random Error
(b) Instrument Error (d) Environmental Error

21. The systematic errors of an instrument can reduced by making _____
(a) The sensitivity of instrument to environmental input as low as possible
(b) The sensitivity of instrument to environmental input as high as possible
(c) Systematic errors does not depend on the sensitivity of Instrument
(d) None of these

22. Random errors in a measuring system are due to
(a) Environmental changes (c) Poor cabling Practices
(b) Use of uncalibrated instrument (d) Unpredictable effects

23. The degree of closeness of the measured value of a certain quantity with its true value is known as:
(a) Accuracy (c) Standard
(b) Precision (d) Sensitivity

24. Error of measurement =
(a) True value-measured Value
(b) Precision-True value
(c) Measured Value-Precision
(d) None of the above
25. The ability by which a measuring device can detect small differences in the quantity being measured by it, is called its
(a) Damping (c) Accuracy
(b) Sensitivity (d) none of the above

26. To compare an unknown with a standard through a calibrated system is called
(a) Direct comparison (c) Both ‘a’ and ‘b’
(b) Indirect Comparison (d) none of the above

27. The following is an internationally recognized and accepted unit system
(a) MKS (b) FPS (c) SI (d) All of these

28. One Yard = _____inch
(a) 36 (b) 38 (c) 40 (d) 42

29. Response of a system from among the following
(a) impulse response (c) frequency response
(b) unit step response (d) step response

30. Degree at which an instrument indicates the changes in measured variable without dynamic error is called:
(a) Speed of response (c) fidelity
(b) Reproducibility of instrument (d) its static characteristics

31. A measuring system consists of
(a) Sensors (c) Signal processing element
(b) Variable conversion elements (d) All of these

32. An instrument in which the value of the measure variable show the instantaneous value and recalibrated by comparison with an absolute instrument .
(a) Absolute instrument (c) Recording instrument
(b) Secondary instrument (d) Integrating instrument

33. The accuracy of measuring instrument at high frequency
(a) Decrease (c) increase
(b) Become zero (d) does not change

34. The difference between measured value and true value changing with time is called:
(a) Static error (c) absolute error
(b) Dynamic error (d) none of these

35. Fundamental units are :
(a) Dependent (c) either a or b
(b) Independent (d) none of these

36. Derived units can be expressed in terms of
(a Fundamental units (c) calibrated units
(b) SI units (d) CGS Units

37. Which of the following is a dynamic characteristic of measuring instruments?
(a) Precision (c) resolution
(b) Fidelity (d) Drift

38. The fundamental units of SI system are the same as that of ;
(a) MKS system (c) CGS Units
(b) FPS System (d) None of these

39. The ability to give same output reading when same input value is applied repeatedly is known as:
(a) Accuracy (c) Stability
(b) Sensitivity (d) Repeatability

40. Precision is the :
(a) Degree of exactness (c)Ability to response
(b) Closeness of a agreement (d)true value of measured variable

Answers : **FUNDAMENTALS OF MEASUREMENT SYSTEM & INSTRUMENTATION**

1- B	2- C	3- B	4- A	5- C	6- A
7- A	8- B	9- B	10- B	11-C	12-B
13-D	14-B	15-B	16-A	17-C	18-B
19-D	20-B	21-A	22-D	23-A	24-A
25-B	26-B	27-C	28-A	29-C	30- C
31- B	32- B	33-A	34-A	35-B	36-B
37-B	38-A	39-D	40-A		

STRESS & STRAIN MEASUREMENT

1. LVDT stands for _____
   (a) Linear virtual Double Transformer
   (b) Linear Virtual Differential Transducer
   (c) Linear Variable Differential Transducer
   (d) Linear Variable Differential Transformer

2. LVDT works on the principle of _____
   (a) Variable resistance (c) Variable capacitance
   (b) Variable inductance (d) Variable pressure

3. How many coils are required to make LVDT?
   (a) 4 (b) 6 (c) 3 (d) 2
4. LVDT is a _____ Transducer.
   (a) Displacement (c) Thermal
   (b) Photoelectric (d) Chemical
5. Which of the following is a displacement Transducer.
   (a) Thermistor (c) Strain Gauge
   (b) LVDT (d) Thermocouple
6. Electrical Strain Gauge works on the principle of _____
   (a) Variation of resistance (c) Variation of inductance
   (b) Variation of capacitance (d) Variation of area
7. Commonly used elements for wire strain gauges are _____
   (a) Nickel & Copper (c) Gold & Brass
   (b) Nickel & Gold (d) Silver & Aluminium
8. Proper functioning of a strain gauge depends on _____
   (a) Strain (c) Bonding
   (b) Stress (d) Length of wire
9. Resistance wire gauges come in _____
   (a) 4 forms (c) 6 forms
   (b) 2 forms (d) 8 forms
10. Commonly used electrical strain gauge is _____
    (a) Open type (c) Unbonded type
    (b) Closed type (d) Bonded type
11. Resistance of the stain gauge must be _____
    (a) Zero (b) Small (c) Large (d) Medium

12. Strain gauge has a _____
    (a) Low temperature co-efficient of resistance
    (b) High temperature co-efficient of resistance
    (c) Zero temperature co-efficient of resistance
    (d) Infinite temperature co-efficient of resistance
13. Load cell is used for the measurement of _____
    (a) Area (b) Force (c) Mass (d) Length
14. Strain is a _____
    (a) Fractional change in Volume
    (b) Fractional change in Area
    (c) Fractional change in length
    (d) fractional change in height
15. LVDT windings wound on
    (a) Steel sheets (c) Ferrite
    (b) Aluminium (d) Copper
16. What is the principle of operation of LVDT
    (a) Mutual Inductance (C) Permeance
    (b) Self Inductance (d) Reluctance

17. Revolution counter is used for the measurement of
    (a) Displacement (c) Acceleration
    (b) Speed (d) None of these
18. In a LVDT ,the two secondary voltages
    (a) are independent of core position
    (b) vary unequally depending on the core position
    (c) vary equally depending on the core position
    (d) are always in phase quadrature

19. A Load cell is a
    (a) Strain Gauge (c) Thermistor
    (b) Photovoltaic cell (d) Pressure pick up

20. Which of the following quantities cannot be measured by a Load cell?
    (a) Pressure (c) Level
    (b) Temperature (d) All of the above

21. Which of the following can be measured using Tachometer?
    (a) Angular speed (c) Acceleration
    (b) Linear speed (d) Vibration

22. Which of the following is correct for AC & DC tachometers.
    (a) Sensitivity of AC tachometer is very high
    (b) Sensitivity of DC tachometer is very high
    (c) Sensitivity of both are equal
    (d) None of the mentioned

23. Which of the following instruments measure amplitude of vibrating body.
    (a) Vibrometers (c) Both a & b
    (b) Seismometers (d) None of these

24. A Tachometer is a device used to measure
    (a) Gravitational pull (c) Surface tension
    (b) Speed of rotation (d) Dispersive power

25. The frequency of rotation in some rotating machinery can be measured by a
    (a) VTVM (c) Spectral meter
    (b) Tachometer (d) Stroboscope

26. The output of the LVDT is in the form of :
    (a) Pulses (c)rotary movement of core
    (b) high frequency signals (d)linear displacement of core
27. Stroboscope is used for the measurement of
    (a) rpm of a flywheel (c) frequency of light
    (b) depression of freezing point (d)liquid level under pressure

28. Load cell is an electromechanical device and is widely use for measurement of
    (a) Static force (c) Temperature
    (b) Dynamic force (d) None of these

29. RVDT stands for:
    (a) Rotary variable differential Transformer
    (b) Rotary valuable differential Transformer
    (c) Rotary valuable differential Transducer
    (d) None of these

30. Stress is

(a) External force (c) Excel force
(b) Internal force (d) radial force

31. Following are the basic types of stress except
(a) Tensile stress (c) Shear stress
(b) Compressive stress (d) Volumetric

32. In RVDT the mutual inductance between the primary and secondary coil varies
(a) Linear with angular displacement
(b) Non-linear with angular displacement
(c) Linear with linear displacement
(d) Non-linear with non-linear displacement

33. Displacement measuring instrument is/are,
(a) Potentiometer (b) LVDT (c) RVDT (d)All of these

34. A Load Cell is an electromechanical device and is widely used for measurement of
(a) static force (c) temperature
(b) dynamic force (d) both a and b

35. A load cell is essentially a
(a) strain gauge (c) resistive potentiometer
(b) Thermistor (d) inductive transducer

36. In wire wound strain gauge, the change in resistance on application of strain is mainly due to
(a) Change in length of wire (c) change in length & diameter of wire
(b) Change in diameter of wire (d) change in resistivity

37. The disadvantage of strain gauge pressure transducer are
(a)It has poor frequency response
(b) They don't have continuous resolution
(c) They can be powered by AC source
(d) It has low output

38. Unbonded strain gauge are
(a) Exclusively used for transducer application
(b) Exclusively used for stress analysis
(c) Commonly used for both a and b
(d) None of these

39. When the combination of strain gauge elastic medium is used for weighting. It is called
(a) Dynamometer (c) Bridge ckt
(b) Load cell (d) none of these

40. Which is an active transducer?
(a) Strain gauge (c) photo voltaic cell
(b) Selsyn (d) photo emissive cell

41. Self generating type transducers are _____ transducers.
(a) Active (c) Secondary
(b) Passive (d) inverse

42. A transducer that converts measured into the form of pulse is called
(a) Active transducer (c) Digital transducer
(b) Analog transducer (d) Pulse transducer

43. Which of the following is a digital transducer?
(a) Strain gauge (c) Thermistor
(b) Encoder (d) LVDT

44. Strain gauge ,LVDT and thermocouple are examples of
(a) Active transducer (c) Analog transducer

(b) Passive transducer (d) Primary transducer

45. Resolution of a transducer depend on
    (a) Material of wire (c) Diameter of wire
    (b) Length of wire (d) Excitation voltage

46. The size of the air cored transducers in comparison to the iron core parts is;
    (a) Smaller (b) larger (c) Same (d) unpredictable

47. The application of LVDT is
    (a) joint motion (c) limb movement
    (b) Finger movement (d) Heart wall motion

48. Function of transducer is to convert
    (a) Electrical signal into non electrical quantity
    (b) Non-electrical quantity into electrical signal
    (c) Electrical signal into mechanical quantity
    (d) All of these

Answers: **STRESS & STRAIN MEASUREMENT**

1- d	2- b	3- c	4- a	5- b	6- a	7-a
8- c	9- b	10-d	11-b	12-a	13-b	14-c
15-c	16-a	17-b	18-b	19-a	20-b	21-a
22-b	23-c	24-b	25-d	26-d	27- a	28-a
29-a	30-b	31-d	32-a	33-d	34-a	35-c
36-c	37-d	38-d	39-b	40-a	41-b	42-d
43-d	44-c	45-c	46-d	47-c	48-b	

MEASUREMENT OF MOTION, VELOCITY

1. The SI unit of Speed is
   (a) km/hr (b) m/s (c) cm/min (d) none of these
2. Speed is define as a change of distance
   (a) the change in distance with respect to time
   (b) the rate of change of distance
   (c) distance moved per unit time
   (d) all of these
3. Which among the following control the speed of DC motor.
   (a) Galvanometer (c) Potentiometer
   (b) Gauge meter (d) tachometer
4. Into which energy signal does the position sensor convert the measured position of servometer of servomechanism?
   (a) Mechanical (b) Electrical (c) thermal (d)Light
5. Revolution counter is used for measurement of
   (a) Displacement (c) Acceleration
   (b) Speed (d) None of these
6. Seismic transducer are used to measure
   (a) Displacement (c) Acceleration
   (b) Velocity (d) All of these
7. A DC tachometer is used for measurement of
   (a) Speed of shaft (c) Diameter of shaft
   (b) Length of shaft (d) None of these
8. A tachometer encoder can be used for measurement of displacement
   (a) in both the direction
   (b) in one direction only
   (c) its output pulses are counted only for the forward direction.
   (d) none of these
9. A tachometer has
   (a) one output (c) three output
   (b) two output (d) All of these
10. In DC tachometer the polarity of output indicates
    (a) polarity of connection to the electric circuit
    (b) direction of the rotation
    (c) both a and b
    (d) none of these
11. Tachometer is used to measure
    (a) angular velocity (c) time
    (b) displacement (d) vibration

Answers: **Measurement of Motion, Velocity**

1-b	2-d	3-d	4-b	5-b	6-d	7-a
8-c	9-c	10-d	11-a			

PRESSURE MEASUREMENT

1. Which of the following conversion takes place in bourdon tubes?
   (a) Pressure to Displacement (c) Pressure to strain
   (b) Pressure to voltage (d) Pressure to force

2. Which of the following devices convert pressure to displacement?
   (a) Diaphragm (c)Capsule
   (b) Bellow (d)Both diaphragm & capsule

3. The instruments used for the measurement of Pressure is/are
   (a) Bellows (c)Fiber optic Pressure sensor
   (b) Diaphragms (d)All of These

4. Bourdon tube is used for the measurement of gauge pressure of
   (a) Gas (c) Solid
   (b) Liquid fluid (d) Both “a” & “b”

5. Dead weight gauge is used for the measurement of pressure of
   (a) About 1000bar (c) About 5000bar
   (b) About 2000bar (d) About 7000bar

6. When visual indication of pressure level is required then the instrument generally used is
   (a) Manometers (c) Bourdon tube
   (b) Diaphragm sensors (d) Resonant wire device

7. Which of the following is not a type of Pressure sensing element?
   (a) Bellows (c) Manometer
   (b) Bourdon tube (d) Orifice plate

8. Absolute Pressure is :
   (a) Gauge pressure + Atmospheric Pressure
   (b) Gauge Pressure – Atmospheric Pressure
   (c) (Gauge Pressure + Atmospheric Pressure)/2
   (d) None of the Above

9. A Pressure instrument is calibrated from 100 to 600 psi. The span of this instrument is :
   (a) 600 (b) 100 (c) 500 (d) 400

10. Normal force acting per unit cross sectional area is called
    (a) Weight (C) Volume
    (b) Pressure (d) Friction

11. Pressure in fluid depends on:
    (a) depth below the surface (c) the value of g
    (b) density of fluid (d) all of the above

12. As depth increases the pressure in fluid :
    (a) increases (c) remains constant
    (b) decreases (d) varies

13. The principle of pirani gauge is based on _____ of the medium.
    (a) Combustibility (c) humidity
    (b) thermal conductivity (d) none of these

14. _____can measure pressure directly.
    (a) Rotameter (c) LVDT

(b) Bourdon tube (d) Strain gauge

15. _____ cannot be used to measure pressure.
    (a) strain gauge (c) LVDT
    (b) Pyrometer (d) Pirani gauge
16. The difference between gauge & absolute pressure is:
    (a) A Vacuum (c) Atmospheric pressure
    (b) 0.433 psi (d) Zero
17. Pressure is defined as :
    (a) Force per unit area (c) A/ F
    (b) F. A (d) None of these
18. Metals used in bourdon tubes should not undergo:
    (a) fatigue (c) creep
    (b) hysteresis (d) all of these

19. A capsule diaphragm is made by welding two diaphragms :
    (a) to a solid base (c) together at the centre
    (b) together around the edge (d) to two other diaphragms

20. Dead weight tester is used for :
    (a) testing dead weights
    (b) measuring process pressure accurately
    (c) producing high pressure
    (d) calibrating pressure instruments

21. One torr is defined as:
    (a) one mm hg (c) one atmosphere
    (b) one inch hg (d) one kilopascal

22. Which gauge measures pressures by sensing changes in the thermal conductivity of a gas?
    (a) Pirani gauge (c) Mcleod gauge
    (b) Slack diaphragm gauge (d) None of them

23. A thermocouple gauge is one type of :
    (a) Ionization gauge (c) Mcleod gauge
    (b) Thermal conductivity gauge (d) none of these

24. The full range from atmospheric pressure to a perfect vacuum is :
    (a) 14.7 psi (b) 0.40 torr (c) 7.14 psi (d) 0.01 torr

25. Diaphragms used in pressure application are:
    (a) light (c) slack
    (b) small in size (d) bimetallic

26. A Mcleod gauge can measure pressure as low as :
    (a) 0.05 torr (c) 0.0005 torr
    (b) 0.005 torr (d) 0.00005 torr

27. What type of manometer is best for measuring low pressure?
    (a) Well (c) U- tube
    (b) Inclined (d) Multiple tube

28. What are the basic pressure elements in a mercury-less manometer?
    (a) u-tube (c) bellows & diaphragms
    (b) siphons (d) capillary tubes

29. A capacitive pressure transducer indicates change in pressure by changing the:
    (a) voltage output of an AC circuit (c) Capacitance

(b) Frequency (d) alternating current

30. In calibrating a pressure instrument ,we first adjust its –
(a) Span (b) Zero (c) Linearity (d) output

31. A Barometer measures :
(a) Absolute pressure (c)both absolute & gauge
(b) gauge pressure (d)dynamic pressure

32. Pressure of 0.0001 psi absolute can be measured by:
(a) Mcleod gauge (c) Thermocouple gauge
(b) Pirani gauge (d) Bourdon gauge

33. Maximum differential pressure in liquid manometer is:
(a) 20 psi (b) 30 psi (c) 40 psi (d) 50 psi

34. Bellows are made of :
(a) Leather (c) Plastic
(b) Paper (d) Thin copper

35. Instruments that measure pressure are generally classified as :
(a) Non-linear (c) Free of hysteresis
(b) Linear (d) None of these

36. Density of water is _____ than mercury.
(a) More (b)Less (c)both a and b (d)none of these

37. Full form of nm stands for
(a) Newton meter (c) Neon milli
(b) Nanometer (d) number of moles

38. Which of the following conversion takes place in bourdon tube
(a) Pressure to displacement (c) Pressure to strain
(b) Pressure to voltage (d) Pressure to force

39. Piezo electric transducer work when we apply _____ to it.
(a) Mechanical force (c) Illuminations
(b) Vibration (d) Heat

40. _____ force calculated as Pressure.
(a) Right angle (c) Parallel
(b) Inclined angle (d) Slanting

41. Differential pressure gauge have _____ inlet point.
(a) 2 (b) 3 (c) 4 (d) 5

42. Atmospheric pressure is typically about _____K pa at sea level.
(a) 100 (b) 200 (c) 300 (d) 400

43. The U-tube was invented by
(a) Newton (c) Evangelista Torricelli
(b) Christian huygen (d) none of these

44. Which instrument called force balance pressure transducer?
(a) Thermocouple gauge (c) Thermal conductivity gauge
(b) Servo pressure transducer (d) Pirani gauge

45. Absolute pressure is abbreviated as
(a) kg/cm^2 (c) psig
(b) Mpa (d) psia

46. 1Mpa = _____ kg/cm^2

(a) 10 (b) 100 (c) 1000 (d) All of these

Answers: **PRESSURE MEASUREMENT**

1-a	2- d	3- d	4- d	5- d	6-a	7- d	
8- a	9- c	10- b	11- d	12-a	13- b	14- b	
15- b	16- c	17- a	18- b	19- b	20- d	21- a	
22- b	23- b	24- a	25- c	26- d	27- b	28- c	
29- c	30- a	31- a	32- a	33- b	34- d	35- b	
36-b	37-b	38-a	39-a	40-a	41-a	42-a	
43-b	44-b	45-d	46-a				

FLOW MEASUREMENT

1. Which of the following flow measuring flow measuring element is inherently linear and requires no signal characterization anywhere in the loop?
   (a) Target (c) Pitot tube
   (b) Venturi (d) Turbine

2. Bernoulli's Equation is a mathematical expression of :
   (a) The ratio of kinetic to viscous force in a flow stream
   (b) Friction loss as fluid moves through a rough pipe
   (c) Potential and Kinetic energies in a flow stream
   (d) Vertical height and Pressure for a static fluid

3. As a compressible fluid moves through a restriction,
   (a) Velocity decreases and Pressure increases
   (b) Velocity increases and Pressure increases
   (c) Velocity increases and Pressure remain the same
   (d) Velocity increases and Pressure decreases

4. A flag flapping in the breeze illustrates what type of dynamic fluid effect?
   (a) Vortex shedding (c) Coriolis effect
   (b) Transitional Flow (d) Laminar effect

5. A magnetic flowmeter will not properly measure the flow rate of :
   (a) Dirty water (c) oil
   (b) Milk (d) Caustic

6. Orifice flow measuring installation is suitable for :
   (a) Slurry flow (c) Steam flow
   (b) Gas Flow (d) Laminar flow

7. Identify which of the following flowmeters inherently measures the mass flow rate:
   (a) thermal (b) Magnetic (c) Flow nozzle (d) Vortex

8. Which of the following instruments used to measure flow on the application of Bernoulli's theorem?
   (a) Venturi meter (c) Nozzle
   (b) Orifice (d) All of the above

9. The errors generated in the pitot tube due to the location are called
   (a) Position errors (c) Negligible errors
   (b) normal errors (d) Positive errors

10. For the measurement of flow the cheapest device is:
    (a) Venturi (c) Flow nozzle
    (b) Dall flowtube (d) Pitot static tube

11. Which of the following represents obstruction type flow measuring systems?
    (a) Centrifugal force type (c) Flow nozzle device
    (b) Rotating vane system (d) None of these

12. The rate at which fliud flows through a closed pipe can be determined by:
    (a) Determine the mass flow rate (c) Either "a" or "b"
    (b) Determine the volume flowrate (d) None of these

13. The device which is used for making temporary measurements of flow
    (a) venturi (c) Orifice plate
    (b) Dall flowtube (d) Pitot static tube

14. The device cannot be used for flow obstruction is :
    (a) Orifice plate (c) Flow nozzle & Dall tube
    (b) Venturi tube (d) Sphere
15. For accurate operation orifice plate flowmeters required:
    (a) Laminar Flow
    (b) Fully developed turbulent flow
    (c) Swirlles & Eddiles in the flowstream
    (d) Transitional flow

16. Compressible flow is a flow that deals with
    (a) Fluid temperature (c) Fluid density
    (b) Fluid Pressure (d) Fluid geometry

17. Compressible flow mainly deals with:
    (a) Solid dynamics (c) Gas dynamics
    (b) Liquid dynamics (d) solid & liquid dynamics
18. Bernoulli's equation cannot be applied when the flow is
    (a) Rotational (c) unsteady
    (b) Turbulent (d) All of these
19. Reynolds number signifies the ratio of:
    (a) Gravity forces to Viscous forces
    (b) Inertia Forces to viscous forces
    (c) Inertia forces to gravity forces
    (d) Buoyant forces to inertia forces
20. The exit velocity in the nozzle increases as per
    (a) Stagnation Point (c) Newton's law
    (b) Continuity equation (d) None of these

21. With the increase in pressure, the exit velocity _____
    (a) Decreases (c) Same
    (b) Increases (d) Independent
22. Which among the following is the formula for volumetric flow rate?
    (a) Q=V/A (b) Q=AV (c) Q=A+V (d) Q=A-V

23. Which among the following is the formula for mass flowrate?
    (a) Q=M/P (b) Q=MP (c) Q=M+P (d) Q=M-P
24. By a Rotameter we can measure:
    (a) Specific gravity (c) Flow
    (b) Viscosity (d) Rotation

25. _____ measures velocity at a point of fluid in a stream.
    (a) Venturi meter (c) Pitot static tube
    (b) pH meter (d) None of these

26. Which of the following represents the correct relation between area of pipes.
    (a) Direct proportionality (c) Equal
    (b) Indirect Proportionality (d) None of these

27. Which of the following converts flow to rotational motion?
    (a) Rotating vane system (c) Both "a" & "b"
    (b) rotameter flow system (d) None of these

28. Centrifugal force elements are used for
    (a) High Flow rate (c) All range of flow rate
    (b) Low Flow rate (d) None of these

29. Conveyers based method is used for the measurement of flow:
(a) Solid (b) Liquid (c) Gas (d) All of these

30. Example of positive displacement meter is:
(a) Variable area flowmeter
(b) Turbine flowmeter
(c) Rotary piston meter
(d) Venturi

31. Reynolds's number of 1000 indicates
(a) Turbulent flow (c) Either "a" or "b"
(b) Laminar Flow (d) None of these

32. Pitot tubes are useful for :
(a) Industrial applications (c) Both "a" & "b"
(b) Laboratory (d) None of these

33. Which of the following flow-metering instruments is an area meter?
(a) Venturi Meter (c) Pitot tube
(b) Rotameter (d) Hot wire anemometer

34. Flow rate through an Orifice is :
(a) Proportional to the pressure differential
(b) Inversely proportional to the square root of pressure differential
(c) Proportional to the square root of pressure differential
(d) Inversely proportional to the square root of pressure differential

35. Flapper Nozzle is a
(a) Pneumatic controller (c) Electronic controller
(b) Hydraulic controller (d) Both a & b

36. V-notch is used to measure flow rate of a liquid in
(a) an open channel
(b) a non-circular cross-section closed channel
(c) vertical Pipeline
(d) horizontal pipeline

37. Pitot tube is used
(a) for highly accurate flow measurement
(b) when the fluid contains lot of suspended material
(c) when the line is large and the velocity is high
(d) both a & c

38. Which of the following devics can measure the largest flow rate?
(a) V-Notch (c) Orifice meter
(b) Rotameter (d) Weir

39. In a low meter Reynolds number describes the
(a) Viscosity fluid (c) Rate of flow
(b) Fluid density (d) Area of cross section

40. The unit of Viscosity
(a) Newton (c) Dyne
(b) Centipoises (d) Kilogram

41. The viscosity of water as compare to mercury
(a) Higher (b) Lower (c) Same (d) Depending upon the temperature

42. The reciprocating piston pump flow meter is mainly used in
(a) Petroleum industry (c) Chemical industry
(b) Steel industry (d) All of these

43. Pitot tubes are

(a) have high accuracy (c) are economical to install
(b) have poor accuracy (d) both b and c

44. Nutating disc flow meters are extensively are used for
(a) residential water service measurement
(b) industry flow measurement
(c) both a and b
(d) None of these

45. Centrifugal force elements are used for
(a) high flow rate (c) medium flow rate
(b) low flow rate (d) none of these

Answers: **FLOW MEASUREMENT**

1- d	2- c	3- d	4- a	5- c	6- b	7- a
8- d	9- a	10- c	11- c	12- c	13-c	14- d
15- b	16- c	17- c	18- d	19- b	20- b	21- a
22- b	23- b	24- c	25- c	26- a	27- a	28- a
29- a	30- c	31- b	32- a	33- b	34- c	35- a
36- a	37- c	38- d	39-c	40-b	41-b	42-a
43-a	44-a	45-a				

LEVEL MEASUREMENT

1. The level of liquid under pressure can be determined using
   (a) bubbler system (c) diaphragm box system
   (b) differential pressure manometer (d) air-trap system
2. Dipsticks are used for the:
   (a) Pressure measurement (c) Displacement Measurement
   (b) Flow Measurement (d) Level Measurement
3. The most common application of float system is
   (a) To monitor the fuel tank level in motor vehicle
   (b) To monitor the flow of solid
   (c) To monitor the flow of liquid
   (d) All of these
4. Capacitive devices are used for the level measurement of
   (a) only liquid (c) Both a and b
   (b) Solid in powdered form (d) None of these

5. In Ultrasonic level gauge ,the ultrasonic source is placed at the
   (a) Bottom of the vessel containing the liquid
   (b) Top of the vessel containing the liquid
   (c) Middle of the vessel containing the liquid
   (d) Far from the vessel containing the liquid

6. In radiation methods , the detector system is located at
   (a) The top of the liquid filled tank
   (b) The bottom of the liquid filled tank
   (c) Middle of the liquid filled tank
   (d) Outside a liquid filled tank

7. A vibrating level sensors consists of
   (a) One piezoelectric oscillators
   (b) Two piezoelectric oscillators
   (c) Three piezoelectric oscillators
   (d) Four piezoelectric oscillators

8. Instrument which is capable of discriminating temperature differences of even 0.1 degree Celsius is,
   (a) Fibre-optic level sensors
   (b) Laser method
   (c) Thermography
   (d) Vibrating level sensors

9. In fibre-optic level sensors, the amount of light loss depends on
   (a) the proportion of cable that is submerged in the liquid
   (b) amount of light which is reflected back
   (c) the proportion of cable that is not in the liquid
   (d) amount of light which is not reflected back

10. Which of the following level measurement technologies cannot be adapted to measure solid level in vessel?
    (a) Displacer (c) Radar
    (b) Floatand tape (d) Ultrasonic
11. Liquid argon level in a pressurized storage tank (at 3 kg/cm^2) is measured by a/an,
    (a) gauge glass (c) Differential pressure gauge
    (b) External float gauge (d) None of these

12. Liquid level in autocalves is measured by
    (a) Simple float (c) Glass gauge
    (b) Differential float type manometer (d) None of these

13. Hydrostatic Pressure type level indicator is a
    (a) Direct method (c) Both a and b
    (b) Indirect method (d) None of these

14. Air purge system level indicator can be used for the measuring the level of
    (a) Corrosive liquids (c) Both a and b
    (b) Abrasive liquids (d) None of these

15. In radiation level detector when the liquid level in the tank rises, the amount of radiation received is,
    (a) Increased (b) Reduced (c)Unchanged (d)None of these

16. The performance of Capacitance level indicator is effected by dirt because they change the
    (a) Area of plate (c) Dielectric constant
    (b) Distance between the plate (d) None of these

Answers : **LEVEL MEASUREMENT**

1- b	2- d	3- a	4- c	5- a	6- d	7- b
8- c	9- a	10- a	11- c	12- b	13-b	14-a
15-b	16-c					

TEMPERATURE MEASUREMENT

1. The output of a Bimetallic element will be _____
   (a) Strain (c) Displacement
   (b) Pressure (d) Voltage

2. Which of the following can be used for measuring Temperature ?
   (a) Metallic Diaphragm (c) Capsule
   (b) Fluid Expansion System (d) Bourdon tube

3. Which of the following is used as indication Instrument in a liquid expansion system?
   (a) Bellows (c) Ammeter
   (b) Bourdon Tube (d) Thermometer

4. The most rugged temperature sensing element is a/an:
   (a) Thermocouple (c) RTD
   (b) Orifice plate (d) Filled Bulb

5. Convert a temperature measurement of 250^0 C into Kelvin.
   (a) 523.2 K (c) 709.7 K
   (b) -209.7 K (d) -23.2 K

6. A type J thermocouple is made of the following metals :
   (a) Aluminium & Tungsten (c) Platinum & Rhodium
   (b) Iron & Constantan (d) Chromel & Alumel

7. Resistance Temperature Detector is _____
   (a) A electrical Transducer (c) A chemical Transducer
   (b) A mechanical Transducer (d) A physical Transducer

8. Sensing element in the Thermometer must provide _____
   (a) Small change in Resistance (c) Large change in Resistance
   (b) No change in Resistance (d) Infinite change in resistance

9. In Optical Pyrometer Temperature is measured by

   (a) Photocell Principle
   (b) Thermocouple Effect
   (c) Comparing the brightness of the source with the brightness os a standard source
   (d) None of the above

10. Bimetallic strips are employed in _____ thermometers.
    (a) Vapour pressure (c) Metal Expansion
    (b) Liquid-expansion (d) Resistance

11. Why is Invar used in bimetallic strips?
    (a) Low density (c) High temperature resistance
    (b) Low-coefficient of expansion (d) High abrasion resistance

12. Resistance Thermometer generally makes use of _____ for the measurement of resistance.
    (a) Potentiometer (c) Diode bridge
    (b) Aurdino (d) Wheatstone bridge

13. Liquid expansion thermometers are filled with _____
    (a) Mercury (c) Gallium

(b) Amalgam (d) Cesium

14. Which metal is used when radiation pyrometer don't produce a satisfactory result.
(a) Chromel-Alumel (c) Copper-Constantan
(b) Iron-Constantan (d) Rhodium-Platinum

15. A Radiation pyrometer is based on _____
(a) Planck's Law (c) Rayleigh-jeans law
(b) Stefan-Boltzmann law (d) Sakuma-Hattori equation

16. Constantan is an alloy containing_____
(a) Nickel & Aluminium (c) Copper & Nickel
(b) Silicon, manganese &aluminium (d) Aluminium & manganese

17. Thermocouple is a _____
(a) Primary Device (c) Tertiary Transducer
(b) Secondary Transducer (d) None of the mentioned

18. Operation of Thermocouple is governed by _____
(a) Peltier effect (c) Thomson effect
(b) Seeback effect (d) All of the mentioned

19. Thermocouple cannot be used to measure_____
(a) Temperature of Gas (c) IR Radiation
(b) Temperature of liquid (d) None of the mentioned

20. A Thermocouple thermometer consists basically of
(a) 1 Wire (b) 2 Wires (c) 3 Wires (d) 4 Wires

21. A Instrument that can be used at a distance ,which allows scientist to work the instrument at a safer place is called
(a) Thermocouple thermometer (c) Barometer
(b) Manometer (d) Infrared thermometer

22. The Ice Point of Kelvin scale is_____
(a) 200^0 K (b) 120^0 K (c) $273.^0$ K (d) 0^0 K

23. Bimetallic strips contain _____ as a metal.
(a) Muntz metal (c) Bronze
(b) Yellow Brass (d) Aluminium

24. At what Temperature are the Celsius and Fahrenheit equal ?
(a) 40^0 (b) -40^0 (c) -0^0 (d) $+100^0$

25. Convert 100^0 C into ^{0} F
(a) 212^0F (b) 100^0 F (c) 180^0 F (d) 200^0F

26. Steam Point is equal to 100^0 C ,which is equal to_____
(a) -373^0 K (b) -173^0 K (c) 373^0 K (d) 173^0 K

27. The Temperature of water in a beaker is 40^0 C. Its value in Fahrenheit is
(a) 110^0 F (b) 104^0 F (c) 130^0 F (d) 116^0 F

28. Normal human body's Temperature is 98.6^0F. In Kelvin Scale , it is
(a) 320 K (b) 300 K (c) 308 K (d) 310 K

29. If we convert 60^0 C into Fahrenheit Scale of Temperature, We get
(a) 300 ^{0}F (b) 180 ^{0}F (c) 140 ^{0}F (d) 250 ^{0}F

30. Which two liquids are used in the construction of maximum thermometers?
(a) Mercury & Water (c) Mercury & Alcohol
(b) Water & Alcohol (d) Mercury & Bromine

31. For measuring the temperature of a furnace which is most suitable instrument?
(a) Resistance thermometer (c)Optical Pyrometer
(b) Thermocouple (d)Bimetallic thermometer

32. Thermocouples is suitable for measuring
(a)Liquid temperature only (c)Very low temperature only
(b)Very high temperature only (d)Both high & Low temperature

33. Psychrometer determines
(a) Humidity of gases (c)water of crystallization
(b) Moisture content of solids (d)hygroscopic nature of solids

34. Starting temperature of Optical Pyrometer is:
(a) 800^0C (b) 400^0C (c) 1200^0C (d) 1500^0C

35. Which thermocouple can be used to measure temperature around 1400^0C?
(a) copper-constantan (C) Platinum-Platinum+ rhodium
(b) Alumel-chromel (d) copper-alumel

36. Which of the following is suitable for measuring the temperature of a red hot moving object?
(a) Thermocouple (c) Thermistor
(b) Radiation pyrometer (d) radiograph

37. Pick out the most suitable instrument for measuring temperature in the range of 40-800^0F?
(a) Mercury thermometer (c) Radiation pyrometer
(b) Bimetallic thermometer (d) optical pyrometer

38. Measurement of sub-zero Celsius temperature in industry is done by
(a) Thermocouples (c) Gas thermometer
(b) Resistance thermometer (d) Bimetallic thermometer

39. Thermocouples
(a)have very low speed of response
(b)cannot be connected to the measuring instrument remotely located
(c)need cold junction compensation
(d)are much less accurate compared to bimetallic or vapour pressure thermometer

40. Selection of material for thermocouple depend on the
(a)depth of immersion in the hot fluid
(b)minimum & maximum temperature
(c)pressure & velocity condition of the fluid whose temperature is to be measured
(d)both “a” and “b”

41. Thermistor has
(a)Negative temperature coefficient of resistance
(b)Positive temperature coefficient of resistance
(c)Null coefficient of resistance
(d)None of these

42. Surface temperature can be measured with
(a) Thermocouple (c) RTD
(b) Strain gauge (d) Diaphragm

43. Resistance of Thermistor depends on
(a) Temperature (c) Current
(b) Voltage (d) None of these

44. Thermocouples are generally used for accurate temperature of
(a) 350^0 C (b) 550^0C (c) 3500^0C (d) 1400^0C

45. In thermal conductivity gauge the measure source of error is heat lost on an account of
(a) radiation (c) convection
(b) conduction (d) none of these

46. Identify the thermocouple type with the highest temperature limit
(a) S type (b) J type (c) K type (d) T type

47. The negative lead of thermocouple is always coloured
(a) Blue (b) yellow (c) red (d) white

48. A Thermowell is a
(a) heat sink
(b) protective tube for a temperature sensing element
(c) temperature sensing device
(d) safety relief device for high pressure

49. Most metallic conductor have a
(a) NTC of resistance (c)zero temperature coefficient of resistance
(b) PTC of resistance (d) None of these

50. In rankine scale the freezing point of water is :
(a) 491^0R (b)671^0R (c) 459^0R (d) 471^0R

51. Liquid filled thermometer work on the principle of
(a) Thermal condition (c) thermal expansion
(b) Change in pressure (d) none of these

52. The freezing and boiling point of water are used as fixed points in
(a) Centigrade scale (c) both a and b
(b) Fahrenheit scale (d) none of these

53. The most common used gas in vapour pressure thermometer is
(a) helium (b) Nitrogen (c) Hydrogen (d)Oxygen

54. _____- directly converts temperature into voltage.
(a) Thermocouple (c) Gear train
(b) Potentiometer (d) LVDT

55. Which of the following is the output of a thermocouple?
(a) Alternating current (c) AC Voltage
(b) Direct current (d) DC Voltage

56. Thermistor is a contraction
(a) thermal resistor (c) electric resistor
(b) laser resistor (d) mechanical resistor

57. Thermostats have
(a) Positive temperature coefficient
(b) Negative temperature coefficient
(c) Zero temperature coefficient
(d) Infinite temperature coefficient

58. Thermostats
(a) sense large changes in temperature
(b) cannot sense any change in temperature
(c) have a positive temperature coefficient of
(d) resistance sense small changes in temperature

59. Thermistor has a resistance of
(a) 250Ω to 500 kΩ (c) 1 Ω to 1 kΩ
(b) 50 Ω to 10 kΩ (d) 100 Ω to 100 kΩ

60. Thermistor material is pressed
(a) under zero pressure (c) under high pressure
(b) under low pressure (d) under low volume

61. Thermistor follows which law for small variations_
(a) Charles's law (b) kvl (c) kcl (d)ohms's law

62. Output of a bimetallic element will be-
(a) Strain (b) Pressure (c) Displacement (d)Voltage

63. In liquid in steel bulb thermometer, which liquid can be used for measuring temperature upto 6000^0c?
(a) Mercury (c) Ammeter
(b) Bourdon tube (d) Thermometer

64. The thermocouple circuit which is used to measure temperature works on-
(a) Seeback effect (c) Thomson effect
(b) Peltier effect (d) None of these

65. In electric resistance thermometer, the thermocouple property is
(a) electric current passing through a metal wire
(b) resistance of a metal wire
(c) voltage between two extreme end points of a metal wire
(d) none of these

66. Which of the following is chosen as a standard thermometric substance?
(a) gas (c) Electric resistance
(b) thermocouple (d) mercury

67. The characteristics of a material or a body which is taken as an indication of change in temperature is known as
(a) Thermodynamics property (c) Thermometric property
(b) thermostatic property (d) None of the above

Answer :- **TEMPERATURE MEASUREMENT**

1- C	2- B	3- B	4- A	5- A	6-B
7- A	8- C	9- C	10- C	11- B	12-D
13- A	14- D	15- B	16- C	17- A	18- D
19- D	20- B	21- A	22- C	23- B	24- B
25- A	26- C	27- B	28- D	29- C	30- C
31- C	32- D	33- A	34- A	35- C	36- B
37- B	38- B	39- C	40- B	41-a	42-c
43-a	44-d	45-d	46-a	47-c	48-b
49-b	50-a	51-c	52-c	53-b	54-a
55-d	56-a	57-b	58-c	59-d	60-c
61-d	62-a	63-a	64-a	65-b	66-a
67-c					

RECORDERS

1. In a Magnetic tape , data are recorded for _____
   (a) Storage (c) Transfer
   (b) Visualising (d) None of these
2. How many variables can be stored in a magnetic tape with track number 16?
   (a) 2 (b) 16 (c) 256 (d) 65536
3. Magnetic tape can be used to store _____
   (a) Analog data (c) Both analog & digital data
   (b) Digital Data (d) None of these

4. Which of the following classes record head belong to?
   (a) Electromagnetic system (c) Mechanical system
   (b) Electronic circuitry (d) None of these

5. Which of the following represents allowed bit rate of digital signal?
   (a) 10 (b) 10^2 (c) 10^4 (d) 10^5
6. Data recorders acquire data from _____
   (a) Transducers (c) Both transducers & Sensors
   (b) Sensors (d) None of these

7. Which of the following device can be used for concurrent measurement of two variables?
   (a) PMMC devices (c) X-Y Plotter
   (b) Pen recorders (d) Circular recorder
8. How many graphic recorders are there?
   (a) Five (b) Ten (c) Three (d) One

9. Recorder is a _____
   (a) Measuring instrument (c) Current divider
   (b) Voltage source (d) Musical tool
10. Efficiency of a recorder is determined using _____
    (a) paper (c) voltmeter
    (b) chart (d) oscilloscope

11. In a Strip chart recorder _____
    (a)biological quantity is measured (c)physical quantity is measured
    (b)chemical quantity is measured (d)no quantity is measured

12. Basic elements of a strip chart recorder are _____
    (a) chalk & board (c) pencil & paper
    (b) pen & pencil (d) pen & chart paper

13. How many types of tracing systems are used in graphical representation?
    (a) two (b) five (c) ten (d) one

14. A Galvanometer based recorder works on the principle of :
    (a) Van der wall's effect (c) Paschen effect
    (b) D'Arsonval movement (d) Azhimuthal quantum number

15. Which of the following recorders are known as null recorders?
    (a) Strip chart recorders (c) potentiometric recorders
    (b) Galvanometer recorders (d) Any of the above

16. The potentiometric recorders have
    (a) High sensitivity

(b) High sensitivity & independence of lead length
(c) Low sensitivity
(d) none of these

17. Strip chart recorder can be recorded by _____
(a) pen& ink stylus (c)thermal, electrical ,optical wiring
(b) impact printing (d)all of the above

18. A Recorder is an instrument used for
(a) recording (c) display
(b) indicating (d) measurement

19. A null type recorder uses
(a) amplifier (c) capacitor
(b) inductor (d) potentiometer

20. A Galvanometer type recorder has
(a) very high input impedance (c) low input impedance
(b) high input impedance (d) very low input impedance

21. A circular recorder uses
(a) rectilinear chart (c) square chart
(b) curvilinear chart (d) circular chart

22. A circular chart uses principle of
(a) electrostatic (c) galvanometer
(b) mechanical & link levers (d) self balancing potentiometer

23. A X-Y recorder uses the principle of
(a) galvanometer (c) electrostatic
(b) mechanical levers (d) self balancing potentiometer

24. An X-Y Plotter uses
(a) single pen (c) a double pen
(b) a single pen/ar mechanism (d)a double pen/arm mechanism

25. A Strip chart recorder uses
(a) a long roll of paper (c) a stationary paper
(b) a circular paper (d) none of these

26. X-Y Recorder is the type of
(a) graphic recorders (c) magnetic tape recorders
(b) Oscillographic recorders (d) digital recorders

27. What is the purpose to use recorder?
(a)To see the event
(b)To control the process
(c)To provide the answer of question which may come up at later time
(d)to maintain the process variable at its set points

28. Graphic recorders is a device which
(a)use observation of process
(b)show the event and trouble of a process
(c)display and store by pen and ink to record the history of physical event
(d)All of the above

29. Which pen moves in circular chart recorder?
(a) V-pen (c) both a and b
(b) Fountain pen (d) none of these

30. A special form of circular chart recorder is known as;
(a) Temperature receiver (c) Flow receiver
(b) Pressure receiver (d) None of these

31. X-Y Recorder used of graphic recording of
(a)3 variable at a time (c) both a and b
(b)relationship between 2 variables (d) none of these

32. What is the working of chopper in X-Y Recorder?
(a)convert AC signal to DC (c)to amplify the signal
(b)Convert DC signal to AC (d)all of these

33. In X-Y Recorder servo motor is used to
(a) balance the system
(b)for moving the chart towards X direction
(c)for moving the chart towards Y direction
(d)both b and c

Answers: **RECORDERS**

1- a	2- b	3- c	4- a	5- d	6- c	7- c
8- c	9- a	10- b	11- c	12-d	13- a	14- b
15- c	16- b	17- a	18- a	19- d	20- c	21-d
22- d	23- d	24- b	25-a	26-a	27-c	28-c
29-c	30-b	31-b	32-b	33-a		

FINAL CONTROL ELEMENTS

1. Final control element is a
   (a) Valve (c) Signal
   (b) Switch (d) Both a and b
2. Which of the following is not a final control elements?
   (a) A Pressure transmitter (c) A Heating element
   (b) An electric motor (d) A Control valve

3. _____ is not a final control element.
   (a) Control Valve (c) Electro-pneumatic converter
   (b) Potentiometer (d) Servometer

4. What is the function of a butterfly valve?
   (a) On/Off Control (c) Pressure control
   (b) Flow regulation (d) Hydraulic control

5. Which of the following is better for on/off control?
   (a) Ball Valve (c) Plug valve
   (b) Butterfly valve (d) Knife valve

6. Which of the following valves are used in high duty cycle applications?
   (a) Check valve (c) Ceramic disc valve
   (b) Clapper valve (d) Choke valve

7. Check valve is also called as _____
   (a) Non-return valve (c) Knife valve
   (b) Gate valve (d) Choke valve

8. What is the purpose of piston valve?
   (a) Regulate fluids
   (b) Regulate fluids carrying suspended solids
   (c) Regulates flow
   (d) Regulates Pressure

9. What is the other name for the plug valve?
   (a) Needle valve (c) Poppet valve
   (b) Slim valve (d) Spool valve

10. What is the purpose of Pinch valve?
    (a) Hydraulic control (c) Flow control
    (b) Slurry flow regulation (d) regulate fluids

11. In globe valves , the flow rate control is determined by _____
    (a) size of the opening (c) Pressure difference
    (b) Lift of the valve plug (d) Gravity

12. Of the below mentioned valves which of the following are used to control the flow of liquid in a single direction?
    (a) Butterfly valve (c) Check valve
    (b) Ball valve (d) Plug valve

13. Which of these are used as throttling valves?
    (a) Butterfly valve (c) Gate valve
    (b) Check valve (d) Sluice valve

14. Which valve is used when a straight line of fluid and minimum restriction is required ?
(a) Gate valve (c) Butterfly valve
(b) Lift check valve (d) Plug valve

15. Which valve is most commonly used in household applications?
(a) Globe valve (c) Butterfly valve
(b) Gate valve (d) Check valve

16. Which of these are usually not preferred for frequent operation?
(a) Ball valve (c) Gate valve
(b) Plug valve (d) Butterfly valve

17. Which type of valve is preferred for vacuum applications?
(a) Diaphragm valve (c) Globe Valve
(b) Butterfly valve (d) Sluice Valve

18. Which valve can be used in the service to handle fluids and gases and at the same time can be used for throttling as well?
(a) Butterfly valve (c) Plug valve
(b) Gate valve (d) Diaphragm valve

19. Which of the following is known as shut off valve?
(a) Air relief valve (c) Pressure relief valve
(b) Sluice valve (d) Altitude valve

20. Which of the following is used to stop the water supplies when required?
(a) Air relief valve (c) Pressure relief valve
(b) Sluice valve (d) Altitude valve

21. The gate valves are made of _____ with brass mountings.
(a) Cement concrete (c) Cast Iron
(b) reinforced concrete (d) galvanized iron

22. _____ valves are used to discharge air from the water pipelines.
(a) Air relief valve (c) Pressure relief valve
(b) Sluice valve (d) Altitude valve

23. Which valve allows water to flow in one direction only.
(a) Air relief valve (c) Reflux valve
(b) Sluice valve (d) Altitude valve

24. Which of the following valve is known as safety valve?
(a) Scour valve (c) Reflux valve
(b) Pressure relief valve (d) Altitude valve

25. _____ valves are used to remove sand and slit from the pipelines.
(a) Air relief valve (c) Scour valve
(b) Sluice valve (d) Altitude valve

26. When a control valve is installed in a process with where the difference pressure drop increasing flow, the best trim characteristic to choose for the valve would be:
(a) Ported (c) Equal percentage
(b) Quick -opening (d) Linear

27. An air to open control valve assembly may be formed with which of these actuator/valve body:
(a) reverse-acting actuator, direct acting valve body

(b) direct acting actuator, direct acting valve body
(c) direct acting actuator, reverse acting valve body
(d) Both a and c

28. The main purpose of a valve positioned is to :
(a) Alter the fall-safe status of the valve
(b) Improve the precision of the valve
(c) Alter the characterization of the valve
(d) Increase the transmitter accuracy

29. The purpose of a valve packing to :
(a) Help to reduce cavitation in the valve trim
(b) increase stiction
(c) Seal process fluid from escaping past the stem
(d) Lubricate the valve trim

30. Cavitation in a control valve is caused by :
(a) Process noise (c) a laminar flow regime
(b) vibration in the piping (d) Pressure recovery

31. Which of the following valves is better for on/off control?
(a) Ball valve (c) Plug valve
(b) butterfly valve (d) Knife valve

32. What is the purpose of pinch valve?
(a) Hydraulic control (c) Flow control
(b) Slurry flow regulation (d) Regulate fluids

33. Actuator converts
(a) Force into motion (c) Motion into force
(b) Motion into pressure (d) None of these

34. How many type of actuators according to the action?
(a) 5 (b) 2 (c) 4 (d) 3

35. Valve is a _____ device.
(a) Electrical (c) Electromechanical
(b) Mechanical (d) Electronics

36. Which actuator gives linear and rotational capability?
(a) Cylindrical actuator (c) Linear Actuator
(b) Rotary actuator (d) All of these

37. AFR stands for ;
(a) Air flow regulator (c) Air flow register
(b) Air filter regulator (d) none of these

38. Which is not a controlling element?
(a) Actuator (c) Pneumatic Actuator
(b) Valve (d) Cascade

39. How many types of Transmitters?
(a) 5 (b) 4 (c) 3 (d) 2

40. HART communicator is used for;
(a) Smart transmitter (c) Both a and b
(b) Conventional transmitter (d) none of these

41. _____ actuator takes the energy to convert into motion by air pressure.
(a) Hydraulic actuator (c) Electrical actuator
(b) Pneumatic actuator (d) None of these

42. _____ actuator powered by a motor which convert mechanical energy into torque.
(a) hydraulic actuator (c) Electrical actuator
(b) Pneumatic actuator (d) none of these

43. Which actuator is not involve in oil?
(a) Hydraulic actuator (c) electrical actuator
(b) Pneumatic actuator (d) none of these

44. _____ regulates the supply of air pressure to a pneumatic actuator.
(a) Hydraulic actuator (c) Positioner
(b) Pneumatic actuator (d) Cylindrical actuator

45. Positioner is used in the range of _____ to control the pressure.
(a) 3 to 5 psi (c) 4 to 20 ma
(b) 1 to 12 psi (d) 1 to 16 ma

46. _____ is an electromechanically operated valve.
(a) Solenoid valve (c) Port valve
(b) Pilot valve (d) Check valve

47. Which of the following logic valve is known as shuttle valve?
(a) OR gate (c) NOR gate
(b) AND gate (d) NAND gate

48. In a pneumatic system ,AND gate is also known as
(a) Check valve (c) Dual pressure valve
(b) Shuttle valve (d) none of these

49. What is a pressure sequence valve?
(a)It is a combination of adjustable pressure relief valve & direction control valve
(b)It is a combination of nonadjustable pressure relief valve and directional control valve
(c)It is a combination of adjustable pressure reducing valve and check valve
(d)It is a combination of adjustable pressure reducing valve and flow control valve

50. A 5/2 Way single solenoid valve has;
(a) 2 ports 2 positions (c) 5 ports 5 positions
(b) 5 ports and 2 positions (d) 2 ports and 5 positions

51. A _____ restricts air flow.
(a) Throttle valve (c) Direction control valve
(b) Shuttle valve (d) Single acting cylinder

52. When the piston area of the cylinder is connected to the atmosphere the piston os the single acting cylinder is pressed by the spring to the,
(a) Cylinder center (c) Cylinder bottom
(b) Cylinder down (d) Cylinder upper

53. Regardless of type, all valves have the following basic parts , with the exception of
(a) Bonnet (b) Nipple (c) Actuator (d) Body

54. The body of a valve typically receives inlet and outlet piping through any of the following types of joints except:
(a) Glued (c) Threaded
(b) Welded (d) Bolted

55. The internal elements of a valve are collectively referred to as a valve's
(a) Guts (b) trim (c) Works (d) packings

56. Which one of the valve parts is not usually considered to be a part of the pressure boundary?
(a) body (c) bonnet
(b) seal rings (d) disk

57. Most valves use _____to prevent leakage from the space between the stem and the bonnet.
(a) o-rings (c) a metal to metal seal
(b) a liquid seal (d) packing

58. Which of the following types of valve uses a flow control element that involves moving a flexible material into or against an orifice ?
(a) Globe and needle valves (c) gate and plug valves
(b) Butterfly and diaphragm valves(d) globe and gate valves

59. Which of the following types of valves cause the greatest head loss when completely open?
(a) Ball valve (c) Butterfly valve
(b) gate valve (d) globe valve

60. Which of the following is a disadvantage of ball valves?
(a) they are large and heavy.
(b) They have high maintenance cost.
(c) they have relatively poor throttling characteristics.
(d) they are among the most expensive of the valve types.

61. The _____ is the most commonly used disk within a gate valve , because of its simplicity and strength.
(a) parallel disk (c) split wedge
(b) flexible wedge (d) solid wedge

62. The gland of a plug valve is equivalent to the _____ of a gate or globe valve.
(a) body (b)packing (c) seat (d) bonnet

Answers: **FINAL CONTROL ELEMENTS**

1- a	2- a	3- b	4- b	5- a	6- c	7- a
8- b	9- b	10- b	11- b	12- c	13- a	14- a
15- a	16- c	17- a	18- c	19- b	20- b	21- v
22- a	23- c	24- b	25- c	26- c	27- d	28- b
29- c	30- d	31-a	32-b	33-a	34-d	35-b
36-b	37-b	38-d	39-d	40-a	41-b	42-c
43-b	44-c	45-a	46-a	47-a	48-c	49-a
50-b	51-a	52-a	53-b	54-b	55-b	56-c
57-c	58-c	59-b	60-c	61-c	62-a	

CONTROL SYSTEM

1. In an Open loop control system
   (a) Output is independent of control input
   (b) Output is dependent on control input
   (c) Only system parameters have affect on the control output
   (d) None of the above
2. For open control system which of the following statement is incorrect?
   (a) Less expensive
   (b) Recalibration is not required for maintaining the required quality of the output
   (c) Construction is simple and maintenance easy
   (d) Errors are caused by disturbances

3. A control system in which the control action is somehow dependent on the output is known as
   (a) Closed loop system (c) open system
   (b) semi closed loop system (d) none of the above

4. In closed loop control system , with positive value of feedback gain the overall gain of the system will
   (a) Decrease (c) be unaffected
   (b) Increase (d) any of the above

5. Which of the following is an open loop control system?
   (a) Field controlled DC motor (c) Metadyne
   (b) Ward Leonard control (d) Stroboscope

6. _____ has tendency to oscillate.
   (a) Open loop system (c) Both a and b
   (b) Closed loop system (d) Neither a nor b

7. A good control system has all the following features except
   (a) good stability (c) good accuracy
   (b) slow response (d)sufficient power handling practice

8. The initial response when tune output is not equal to input is called,
   (a) Transient response (c) Dynamic response
   (b) Error response (d) Either of the above

9. An automatic toaster is a _____ loop control system.
   (a) Open (c) Partially closed
   (b) Closed (d) Any of the above

10. A closed loop system is distinguished from open loop system by which of the following?
    (a) Servomechanism (c) Output pattern
    (b) Feedback (d) input pattern

11. _____ is a closed loop system.
    (a) Auto-pilot for an aircraft (c) Car starter
    (b) Direct current generator (d) Electric switch

12. Which of the following should be done to make an unstable system to stable?
    (a) the gain of the system should be decreased
    (b) the gain of the system should be increased
    (c) the number of poles to the loop transfer function should be increased
    (d) the number of zeros to the loop transfer function should be increased

13. As a result of introduction of negative feedback which of the following will not decrease?

(a) Bandwidth (c) Distortion
(b) Overall gain (d) Instability

14. The output of a feedback control system must be a function of
(a) reference and output (c) input and feedback signal
(b) reference and input (d) output and feedback signal

15. A control system with excessive noise , is likely to suffer from
(a) saturation in amplifying stages
(b) loss or gain
(c) vibrations
(d) oscillations

16. Transfer function of a system is used to calculate which of the following?
(a) the order of the system (c) the output for any given input
(b) the time constant (d) the steady state gain

17. On which of the following factors does the sensitivity of a closed loop system to gain changes and load disturbances depend?
(a) frequency (c) forward gain
(b) loop gain (d) all of the above

18. In a control system the output of the controller is given to,
(a) Final control element (c) Comparator
(b) Amplifier (d) Sensor

19. A Controller ,essentially is a
(a) Sensor (c) Comparator
(b) Clipper (d) Amplifier

20. The on-off controller is a _____ system.
(a) Digital (c) Non-linear
(b) Linear (d) Discontinuous

21. _____ signal will become zero when the feedback signal and reference signs are equal.
(a) Input (c) Feedback
(b) Actuating (d) Reference

22. A single other than the reference input that tends to affect the value of controlled variable is known as:
(a) disturbance (c) control element
(b) command (d) reference input

23. _____ is the reference input minus the primary feedback.
(a) Manipulated variable (c) Actuating signal
(b) Zero sequence (d) Primary feedback

24. With feedback _____ increases.
(a) system stability (c) gain
(b) sensitivity (d) effects of disturbing signals

25. With feedback _____ reduces.
(a) system stability (c) system stability and gain
(b) system gain (d) none of the above

26. Automatic control system in which output is a variable is called
(a) Closed loop system (c) Automatic regulating system

(b) Servomechanism (d) Process control system

27. A negative gain margin expressed in decibels means
(a) a stable system (c) critically damped system
(b) unstable system (d) both “a” and “c”

28. Bode stability method uses
(a) open loop transfer function (c) either a or b
(b) closed loop transfer function (d) neither a or b

29. Routh stability method uses
(a) open loop transfer function (c) either a or b
(b) closed loop transfer function (d) neither a or b

30. Which of the following controllers has maximum offset
(a) P- controller (c) P-D Controller
(b) P-I Controller (d) P-I-D Controller

31. Process degrees of freedom
(a) indicates the maximum number of controller to be used
(b) indicates the minimum number of controller to be used
(c) determines both maximum and minimum number of controller to be used

(d) gives no idea of controllers

32. Use of I-controller along with P-Control facilitates
(a) elimination of offset (c) reduction of stability time
(b) reduction of offset (d) both b and c

33. Cascade control means
(a) feed forward control (c) on-off control

(b) more than one feedback loop (d) one feedback loop

34. Which of the following controller has the least maximum deviation?
(a) P-Controller (c) P-I-D Controller
(b) P-I Controller (d) P-D Controller

35. Offset
(a) varies with time (c) does not vary with time
(b) varies exponentially with time (d) varies as square of the time

36. Regulator problem means
(a) set point is constant (c)both set point and load constant
(b) load is constant (d)neither set point nor load constant

37. Phase plane method is used for
(a) linear-behaviour (c) both a and b
(b) non-linear behaviour (d) neither a and b

38. Laplace transform method is used for
(a) linear-behaviour (c) both a and b
(b) non-linear behaviour (d) neither a and b

39. P-I controller as compared to P-controller has a
(a) higher maximum deviation (c) longer period of oscillation
(b) longer response time (d) all a , b , and c

40. Difference at any instant between the value of controlled variable and the set point is called
(a) deviation (c) error ratio
(b) derived time (d) differential gap

41. The time difference by which the output oa a P-D controller leads the input changes linearly with time is called
(a) error ratio (c) proportional sensitivity
(b) derivative time (d) gain

42. Steady state deviation resulting from a change in the value of the load variable is called
(a) offset (c) deviation
(b) error ratio (d) static ratio

43. A controller action in which there is a continuous linear relation between the value of the controller variable and rate of change of controlled output signal is called,
(a) proportional action (c) derivative action
(b) integral action (d)Proportional-derivative action

44. Steady state ratio of the change of proportional controller output variable and the change in actuating signal is called
(a) proportional sensitivity (c) rangeability
(b) reset rate (d) integral action

45. On-Off control
(a) fully opens the final control element when the measured variable is below the set point
(b) fully closes the final control element when the measured variable is above the set point
(c) is a two position control adequate to control a process with slow reaction rate and minimum dead time or transfer lag
(d) all a , b , c

46. It is the variable which is manipulated to make the controlled variable at set point value.
(a) Manipulated variable (c) Control variable
(b) Process variable (d) None of these

47. _____ is an interconnection of components forming system configuration that will provide a desired system response.
(a) Control system (c) Mechatronics
(b) Automation (d) Instrumentation

48. The deviation of controlled variable from the set point is called _____.
(a) Control lag (c) Error
(b) Automation (d) Process lag

49. Control lags refers to the time for the process control loop to make necessary adjustments to the final control element.
(a) Control lag (c) Error
(b) Automation (d) Process lag

50. The _____ is function which describes the process and provides the information about other process parameters which influence the controlled variable.
(a) Control system (c) Process equation
(b) Automation (d) Instrumentation

51. Reciprocal of proportional band is called
(a) Reset (b)Percentage (c)gain (d) Rate

52. Reset control action in often expressed in unit of
(a) second per rate (c) time constant ratio
(b) minutes (d) repeat per minute

53. Integral control action output equal to output of proportional control action is
(a) non-zero value (c) error signal is zero
(b) error free value (d) non-zero error

54. Which notation represents the feedback path in closed loop system representation?
(a) b(t) (b) c(t) (c) e(t) (d) r(t)

55. How is an output represented in the control systems?
(a) r(t) (b) c(t) (c) x(t) (d) y(t)

56. The output signal is feedback at the input side from the _____ point.
(a) summing (c) Take-off
(b) Differential (d) All of the above

57. Which of the following is also known as PID controller?
(a) two term controller (c) four term controller
(b) three term controller (d) Proportional controller

58. Which of the following is a three mode control action?
(a) PI controller (c) PID controller
(b) PD controller (d) ALL of these

59. What is the full form of HART?
(a)Highly addressable remote transducer
(b)highway addressable radio transducer
(c)highway addressable remote transducer
(d)High addressable radio transducer

60. Which controller has the potential to eliminate/overcome the drawback of offset in proportional controllers?
(a) P-I (c) Both a and b
(b) P-D (d) none of these

61. In P-I controller ,what does an integral of a function compute?
(a) Density of curve (c) volume over the curve
(b) Area under the curve (d) Circumference of curve

62. A good control system should be sensitive to _____
(a) Internal disturbances (c) Parametric variations
(b) Environmental parameters (d) input signals

63. With feedback _____ reduces .
(a) System stability (c) System stability & gain
(b) System gain (d) none of these

64. A conditionally stable system exhibits poor stability at
(a) Low frequencies
(b) reduced values of open loop gain
(c) increased value of open loop gain
(d) none of the above

65. Effect of feedback on the plant is to
(a) Control system transient response
(b) Reduce the sensitivity to plant parameter variations
(c) both a and b
(d) none of these

66. _____ has tendency to oscillate.
(a) open loop system (c) both a and b
(b) closed loop system (d) neither a nor b

67. A good control system has all the following features except
(a) good stability (c) good accuracy
(b) slow response (d)sufficient power handling capacity

68. A car is moving at a constant speed of 50 km/hr, which of the following is the feedback element for the driver?
(a) Clutch (b) Eyes (c) needle of the speedometer
(d) steering wheel (d) none of these

69. Automatic control system in which output is a variable is called
(a) Closed loop system (c) Automatic regulating system
(b) Servomechanism (d) Process control system

70. Transient response in the system is basically due to
(a) Forces (b)Friction (c) Stored energy (d)coupling

71. Effect of feedback on the plant is to
(a) Control system transient response
(b) Reduce the sensitivity to plant parameter variations
(c) Both a and b
(d) none of these

72. Transfer function of a system can used to study its
(a) Steady state behaviour (c) both a and b
(b) transient behaviour (d) none of these

73. The initial response when tune output is not equal to input is called
(a) Transient response (c) Dynamic response
(b) Error response (d) Either of the above

74. A control system working under unknown random action is called
(a) Computer control system (c) Stochastic control system
(b) Digital data system (d) Adaptive control system

75. An automatic toaster is a _____ loop control system.
(a) open (b) closed (c) partially closed
(d) any of the above

76. An extremely introduced signal affecting the controlled output is called a
(a) Feedback (b) Stimulus (c) Signal (d)gain control

77. A closed loop control system is distinguished from open loop system by which of the following?
(a) Servomechanism (C) output pattern
(b) feedback (d) input pattern

78. _____ is a part of the human temperature control system.
(a) digestive system (d) ear
(b) perspiration system (d) leg movement

79. _____ is a closed loop system.
(a) Auto pilot for an aircraft (c) car starter
(b) Direct current generator (d) electric switch

80. The derivative control action is typically used when controlling , but rarely used when controlling.
(a) Temperature (b) Flow, Level
(c)pH , temperature (d) Level, Temperature (e)Level, flow

81. Process always require some degree of control action to achieve set point.
(a) Integrating, Derivative (c) self regulating, proportional
(b) Integrating, Feed forward (d) runway ,linear

82. The reciprocal of proportional band is called;
(a) Reset (b) Percent (c)Minutes per repeat
(d) gain (e) rate

83. Fast, self regulating processes typically respond well to aggressive control action.

(a) Non-linear (b) Derivative (c) Proportional
(d) reset (e) Gain

Answers : **CONTROL SYSTEM**

1- a	2- b	3- a	4- a	5- a	6- b
7- b	8- a	9- a	10- b	11- a	12-b
13- a	14-a	15-a	16-c	17-d	18-a
19-c	20-d	21-b	22-a	23-c	24-a
25-b	26-d	27-b	28-a	29-b	30-a
31-a	32-a	33-b	34-d	35-c	36-a
37-a	38-a	39-d	40-a	41-b	42-a
43-a	44-a	45-c	46- a	47- a	48- c
49- a	50- c	51-c	52-d	53-a	54-a
55-b	56-c	57-b	58-c	59-c	60-a
61-b	62-d	63-b	64-b	65-c	66-b
67-b	68-c	69-d	70-c	71-c	72-c
73-a	74-c	75-a	76-b	77-b	78-b
79-a	80-a	81-e	82-d	83-d	

PROGRAMMABLE LOGIC CONTROLLER

1. When _____ contacts are actuated , they disrupt the power supply through them.
   (a) normally open type (c) both a and b
   (b) normally closed type (d) none of the above

2. How is the speed of operation of conventional relay system as compared to digital controllers?
   (a) very slow (c) same
   (b) very fast (d) almost similar

3. The capability of conventional relay systems for complex operation is _____ that of the PLCs.
   (a) poor than (c) as good as
   (b) excellent than (d) unpredictable as

4. How is the noise immunity of PLCs to electrical noise as compared to that of conventional relay controllers?
   (a) poor
   (b) excellent
   (c) as good as noise immunity of conventional relay controllers
   (d) unpredictable

5. _____ of PLCs can be done in very little time.
   (a) Programming (c) Commissioning
   (b) Installation (d) All of the above

6. PLC can be _____ in plant to change the sequence of operation.
   (a) only programmed (c)programmed & reprogrammed
   (b) only reprogrammed (d) able to give a set-point

7. The PLC is used in _____
   (a) machine tools
   (b) automated assembly equipments
   (c) moulding and extrusion machines
   (d) all of the above

8. Which of the following cannot be an input that is given to the PLC?
   (a) manual switches (c) Sensors
   (b) Relays (d) None of the above

9. The acronym PLC stands for:
   (a) Pressure load control
   (b) Programmable logic controller
   (c) Pneumatic logic capstan
   (d) PID loop controller

10. Ladder logic programming consists of :
    (a) Virtual relay contacts and coils
    (b) Logic gate symbols with connecting lines
    (c) Function blocks with connecting lines
    (d) text-based code

11. In a PLC, the scan time refers to the amount of time in which .....
    (a) the technician enter the program
    (b)timers and counters are indexed by

(c)one rung of ladder logic takes to complete
(d)the entire program takes to execute

12. The difference between online and offline PLC programming is .....
    (a) whether the PLC is running or stopped
    (b) whether the programming pc has internet connectivity
    (c) the type of programming cable used
    (d) where the edited program resides

13. In PLC programming , a retentive function is one that:
    (a) defaults to the On state
    (b) defaults to the off state
    (c) can not be edited or deleted
    (d) is not reset after a power cycle

14. In OR function implemented in ladder logic uses:
    (a) normally closed contacts in series
    (b) normally open contacts in series
    (c) normally open contacts in parallel
    (d) normally closed contacts in parallel

15. A good application for a timed interrupt in a PLC program would be:
    (a) a communications function block
    (b) a PID function block
    (c) a math function block
    (d) a motor start/stop rung

16. Programming language of PLC is
    (a) Function block diagram (C) Ladder
    (b) statement list (d) All of the above

17. PLC's analog input/output has
    (a) 1 bit address (c) 1 word address
    (b) 1 byte address (d) 1 double word address

18. The PLC were originally designed to replace
    (a) Analog controllers (c) Microcomputers
    (b) DCS (d) hardwired control

19. Which one of the following is not a PLC manufacturer?
    (a) Siemens (c) Microsoft
    (b) Mitsubishi (d) ABB

20. Solenoid, lamps, motors are connected to
    (a) Analog input (c) Digital input
    (b) Analog output (d) Digital output

21. PLC means _____ Logic controller.
    (a) Programmable (c) Periodic
    (b) Peripheral (d) None of these

22. Unitary PLC has 20 inputs and _____ outputs.
    (a) 20 (b) 12 (c) 10 (d) 8

23. PLCs having less than _____ inputs and outputs are called as small PLC.
    (a) 50 (b) 200 (c) 100 (d) 150

24. To protect a PLC from any incoming surges from the field , isolates devices such as _____ are used.

(a) Transformer (c) Transducer
(b) ADC (d) all of the above

25. _____ language can be generated separately and then downloaded separately in the PC.
(a) Online (c) Basic
(b) Offline (d) None of these

26. The _____ instruction is used to turn an output on or off after its timer has been on for a preset time interval.
(a) Retentive time (c) Timer off delay
(b) Timer on delay (d) None of these

27. What is the first designing an effective PLC control system
(a) approach the system in a system manner
(b) flow chart of the process
(c) define the control task
(d) define the control strategy

28. Ladder logic programming consists primarily of
(a) Virtual relay contacts and coils
(b) Logic gate symbols with connecting lines
(c) Function block with connecting lines
(d) text based code

29. In PLC the scan time refers to the amount of time in which
(a) the technician entered the programme
(b) timer and counter are indexed by
(c) the entire programme takes to execute
(d) transmitted data communication must finished

30. An example of discrete(digital) control is
(a) Turning a lamp ON or OFF
(b) varying the volume of a music system
(c) varying the brightness of a lamp
(d) Controlling the speed of a fan

Answers: **PLC**

1- b	2- a	3- a	4- a	5- d	6- c	7- d
8- d	9- b	10- a	11- d	12-d	13-d	14-c
15-b	16-d	17-c	18-d	19-c	20- d	21-a
22-b	23- c	24- a	25- b	26- a	27-c	28-a
29-c	30-a					

NETWORKING

1. There are _____ internet service providers.
   (a) Regional (c) National and international
   (b) Local (d) All of the above

2. _____ refers to the physical or logical arrangements of a network.
   (a) Topology (c) Data flow
   (b) Mode of operation (d) none of the above

3. A _____ is a data communication system spanning states ,countries, or the whole world.
   (a) MAN (b) WAN (C)LAN (d) None of these

4. A _____ connection provides a dedicated link between two devices.
   (a) Primary (c) Secondary
   (b) Multipoint (d) Point-to-point

5. Which topology requires a multipoint connection?
   (a) Bus (b) Star (c) Mesh (d) Ring

6. A _____ is a set of rules that governs data communication.
   (a) Protocol (c) Standard
   (b) Forum (d) None of these

7. In a _____ connection, two and only two devices are connected by a dedicated link.
   (a) Multipoint (c) a and b
   (b) Point-to-point (d) None of these

8. The information to be communicated in a data communication system is the _____.
   (a) Medium (c) Message
   (b) Protocol (d) Transmission

9. _____ defines how a particular how a particular pattern to be interpreted and what action is to be taken based on that interpretation.
   (a) Syntax (c) Timing
   (b) Semantics (d) None of these

10. Frequency of failure and network recovery time after a failure are measure of the _____ of a network.
    (a) Performance (c) Reliability
    (b) Security (d) Feasibility

11. A television broadcast is an example of _____ transmission.
    (a) half-duplex (c) full-duplex
    (b) simplex (d) automatic

12. Data flow between two devices can occur in a _____ way.
    (a) simplex (c) full duplex
    (b) half-duplex (d) all of the above

13. _____ are special interest groups that quickly test, evaluate and standardize new technologies.
    (a) standards organizations (c) Forums
    (b) Regulatory agencies (d) All of the above

14. A _____ is a data communication system within a building ,plant, or campus, or between nearby buildings.
    (a) LAN (c) WAN
    (b) MAN (d) none of these

15. This was the first network.
(a) CSNET (c) ARPANET
(b) NSFNET (d) ANSNET

16. Devices may be arranged in a _____ topology.
(a) Mesh (c) bus
(b) ring (d) all of the above

17. _____ is the protocol suite for the current internet.
(a) UNIX (c) TCP/IP
(b) NCP (d) ACM

18. _____ is a collection of many separate networks.
(a) An internet (c) A LAN
(b) A WAN (d) None of these

19. In a _____ connection , three or more devices share a link.
(a) point to point (c) a and b
(b) multipoint (d) None of these

20. Communication between a computer and a keyboard involves _____ Transmission.
(a) simplex (c) full-duplex
(b) half-duplex (d) automatic

21. Which topology requires a central controller or hub?
(a) Mesh (c) Ring
(b) Bus (d) Star

22. The _____ is the physical path over which a message travels.
(a) Protocol (c) Medium
(b) Signal (d) All of these

23. An unauthorized user is a network _____ issue.
(a) Security (c) Performance
(b) Reliability (d) All of these

24. In a _____ transmission the channel capacity is shared by both communicating devices at all times.
(a) Simplex (c) Full-duplex
(b) Half-duplex (d) Half-simplex

Answers: **NETWORKING**

1-d	2-a	3-b	4-d	5-a	6-a	7-b
8-c	9-b	10-c	11-b	12-d	13-c	14-a
15-c	16-d	17-c	18-a	19-b	20-a	21-d
22-c	23-a	24-c				

DCS & SCADA

1. What is the full form of SCADA?
   a) Supervisory Control and Document Acquisition
   b) Supervisory Control and Data Acquisition
   c) Supervisory Column and Data Assessment
   d) Supervisory Column and Data Assessment

2. DCS is a _____
   a) Distributed Control System
   b) Data Control System
   c) Data Column System
   d) Distributed Column System

3. What is SCADA?
   a) Software
   b) Process
   c) System
   d) Hardware

4. The control in SCADA is _____
   a) Online control
   b) Direct control
   c) Supervisory control
   d) Automatic control

5. When did the SCADA start?
   a) 1980s
   b) 1990s
   c) 1970s
   d) 1960s

6. How many levels are present in a complex SCADA system?
   a) 3 – levels
   b) 5 – levels
   c) 4 – levels
   d) 6 – levels

7. Which of the following is not the component of a SCADA system?
   a) Database server
   b) I/O system
   c) PLC controller
   d) Sparger controller

8. Which of the following is the heart of a SCADA system?
   a) PLC
   b) HMI
   c) Alarm task
   d) I/O task

9. A ……..consists of high speed, unidirectional digital communication channel which is arranged as a closed loop or ring microcomputers are attached to the ring by ring interface units.
   a) shared bus system
   b) hierarchical system
   c)ring system
   d)all

10. A Dynamic data exchange ……is a program that can obtain from a DDE server.
    a) Bus
    b)Server
    c)network
    d)client

11. Sensors & control relays can't generate/interpret protocol communication,……..is needed to provide an interface between the sensors & the SCADA network.
    a)remote terminal units
    b) human machine interface
    c) field instruments
    d) all

12. combine communication paths to & from many RTUs into a single bit stream, usually using time division multiplexing or other such bit stream manipulation technique
    a)PLC
    b)HMI
    c)barriers
    d) multiplexers

13. A central host computer server or servers called……..
    a)switch
    b)master terminal units
    c) junction box
    d) microcontroller

14 ……consists of number of microcomputer / minicomputers are connected in a tree structure
    a)ring system
    b) hierarchical system
    c)shared bus system
    d)all

15. A SCADA system will include
    a) networks
    b) HMI
    c) software
    d) all

16. In ……the connected processors communicated over a common channel using time sharing, thus allowing attached computers to transmit information in short duration , high speed bursts.
    a)ring system
    b) hierarchical system
    c)shared bus system
    d)all

17. A collection of standard custom software systems used to provide the SCADA central host & operator terminal application, support the communications system & monitor & control remotely located field data interface devices called as……
    a)HART protocol
    b)I/O module
    c) network gateway
    d)HMI

18. SCADA systems encompass the transfer of data between a central host computer & a no of ……& PLC& the central host & the operator terminal
    a)I/O module

b) microcontroller
c) RTUs
d) motor control center

19. Before planning an alarm system within the SCADA one should consider
    a) how operators will be notified of those alarms?
    b) what actions will occurs in response to those alarms
    c) what condition triggers the alarm
    d) all

20. A SCADA system performs data acquisition, networked data communication, _____ and control.
    (a) data presentation (c) Microcontroller
    (b) DCS (d) None of these

Answer : **DCS & SCADA**

1- b	2- a	3-b	4-c	5- d	6- c	7- d
8- d	9- c	10- d	11-a	12-d	13-b	14-b
15-d	16-c	17-d	18-c	19-d	20- a	

HYDRAULIC SYSTEM AND COMPONENTS

1. In hydraulic systems,

   a. the mechanical energy is transferred to the oil and then converted into mechanical energy
   b. the electrical energy is transferred to the oil and then converted into mechanical energy
   c. the mechanical energy is transferred to the oil and converted into electrical energy
   d. none of the above

2. Which of the following is used as a component in hydraulic power unit?

   a. pressure gauge
   b. filler gauge
   c. valve
   d. reservoir

3. Rotary motion in a hydraulic power unit is achieved by using
   a. hydraulic cylinder
   b. pneumatic cylinder
   c. both hydraulic and pneumatic cylinder
   d. none of the above
4. Accessories used in a hydraulic power unit adjust pressure and are used to generate flow and direction of the fluid.
   a. True
   b. False

5. Which of the following statements are true?
   1. Bell housing connects motor and pump
   2. Centrifugal pump is a non-positive displacement pump
   3. Centrifugal pumps allow the back flow of fluid from delivery side to the suction side of the pump
   4. The function of vent plug used in a reservoir is to flush out oil

   a. 1, 2 and 4
   b. 2, 3 and 4
   c. 2 and 3
   d. all the above
6. Which of the following is used as an accessory in hydraulic power unit?
   a. pumps
   b. valves
   c. motor
   d. reservoir
7. Which type of pump is used for lifting water from the ground surface to the top of the building?
   a. centrifugal pump
   b. turbine pump
   c. submersible pump
   d. all the above
8. Pumps used in hydraulic applications are
   a. positive displacement pumps
   b. variable displacement pumps
   c. fixed displacement pumps
   d. all the above
9. What is a positive displacement pump?
   a. oil from suction side of the pump flows completely to the delivery side
   b. volume of fluid discharged cannot return back to the suction side of the pump

c. discharges fixed volume of fluid every cycle
d. all the above

10. While operating a positive displacement pump,
a. the shut-off valve should be closed on delivery side
b. the shut-off valve should be closed on suction side
c. the shut-off valve should be opened on delivery side
d. none of the above

11. Positive displacement pump used in hydraulic systems have
a. high viscosity of fluids
b. low efficiency
c. required volume of fluid cannot be discharged
d. all the above

12. Heavy lifting work is often accomplished by shifting fluids in big machines. The power system of such machines can be described as
a) Reciprocating
b) Pneumatic
c) Hydraulic
d) Hybrid

13. The scientific principle that makes hydraulic systems possible is
a) Pascal's principle
b) Boyle's law
c) Bernoulli's principle
d) The fluid flow principle

14. Pneumatic and other power systems can support three kinds of motion; they are
a) Linear, reciprocating, and random motion
b) Linear, flowing, and rotary motion
c) Linear, zigzag, and spiral motion
d) Linear, reciprocating, and rotary motion

15. A one-way valve that lets air into the reservoir of a compressor, but doesn't let it out, is a
a) Check valve
b) Receiver valve
c) Control valve
d) Three way valve

16. 5/2 way single solenoid valve has:
a) 2 ports 2 positions
b) 5 ports 2 positions
c) 5 ports 5 positions
d) 2 ports 5 positions

17. The _____ converts the compressed air energy into mechanical energy in the form of linear movement in one direction only.
a) Piston cylinders
b) Double acting cylinders
c) Single acting cylinders
d) Hydraulic pumps

18. A _____ restricts air flow.
a) Throttle valve
b) Shuttle valve
c) Directional control valve
d) Single acting cylinder

19. When the piston area of the cylinder is connected to the atmosphere, the piston of the single-acting cylinder is pressed by the spring to the _____
a) Cylinder center
b) Cylinder down

c) Cylinder bottom
d) Cylinder upper

20. Which fluid is used in hydraulic power systems?
    a. water
    b. oil
    c. non-compressible fluid
    d. all of the above

21. Pressure of 1 bar is equal to
    a. 14.5 psi
    b. 145 psi
    c. 12.5 psi
    d. 145 x 10^{-6} psi
22. What effect does overloading have on fluid power and electrical systems?
    a. electrical components get damaged in electrical systems
    b. fluid power system stops working without damaging the components
    c. both a. and b.
    d. none of the above

23. How is power transmitted in fluid power systems?

    a. power is transmitted instantaneously
    b. power is transmitted gradually
    c. both a. and b.
    d. none of the above
24. The resistance offered to the flow of fluid inside a piston develops into
    a. pressure
    b. force
    c. stress
    d. all of the above
25. At low pressures, liquids are
    a. compressible
    b. non-compressible
    c. unpredictable
26. In hydraulic systems,
    a. the mechanical energy is transferred to the oil and then converted into mechanical energy
    b. the electrical energy is transferred to the oil and then converted into mechanical energy
    c. the mechanical energy is transferred to the oil and converted into electrical energy
    d. none of the above
27. Which of the following is used as a component in hydraulic power unit?
    a. pressure gauge
    b. filler gauge
    c. valve
    d. reservoir
28. Rotary motion in a hydraulic power unit is achieved by using
    a. hydraulic cylinder
    b. pneumatic cylinder
    c. both hydraulic and pneumatic cylinder
    d. none of the above
29. What is the relation between speed and flow rate for fixed displacement vane pump?
    a. flow rate increases with increase in speed of rotor
    b. flow rate decreases with increase in speed of rotor
    c. flow rate is constant and does not change with change in speed
    d. none of the above

30. Which type of motion is transmitted by hydraulic actuators?
    a. linear motion
    b. rotary motion
    c. both a. and b.
    d. none of the above
31. What is the function of electric actuator?
    a. converts electrical energy into mechanical torque
    b. converts mechanical torque into electrical energy
    c. converts mechanical energy into mechanical torque
    d. none of the above
32. Which of the following is a hydraulic cylinder based on construction?
    a. single acting cylinder
    b. double acting cylinder
    c. welded design cylinder
    d. all of the above
33. Which energy is converted into mechanical energy by the hydraulic cylinders?
    a. hydrostatic energy
    b. hydrodynamic energy
    c. electrical energy
    d. none of the above
34. What is the advantage of using a single acting cylinder?
    a. high cost and reliable
    b. honing inside the inner surface of pump is not required
    c. piston seals are not required
    d. all of the above
35. What is the function of a flow control valve?
    a. flow control valve changes the direction of oil flow
    b. flow control valve can adjust the flow rate of hydraulic oil
    c. both a. and b.
    d. none of the above
36. What does the numbers in 4/2 valve mean?
    a. 4 positions and 2 ways
    b. 4 ways and 2 positions
    c. none of the above

37. Which type of solenoid has more chances of coil failure?
    a. AC solenoid
    b. DC solenoid
    c. both AC and DC solenoids
    d. none of the above
38. Which stage in two stage direction control valve is solenoid operated?
    a. main stage direction control valve
    b. pilot stage direction control valve
    c. both stages in two stage direction control are solenoid operated
    d. none of the above
39. Which of the following is a gas charged accumulator?
    a. bladder type
    b. spring loaded accumulator
    c. weighted accumulator
    d. all of the above
40. How is pressure of fluid under piston calculated in a weighted accumulator?
    a. pressure of fluid = (weight added / piston area)
    b. pressure of fluid = (piston area / weight added)
    c. pressure of fluid = (weight added / piston force)
    d. pressure of fluid = (piston force / weight added)
41. Which of the following gas is used in gas charged accumulator?

a. oxygen
b. nitrogen
c. carbon dioxide
d. all of the above

42. Why is the pilot operated check valve used in clamping operation?
a. to reduce leakage in spool valve
b. to avoid decrease in pressure during clamping
c. both a. and b.
d. none of the above

43. Leakage in rotary chucks can be compensated by
a. flow control valve
b. pilot operated check valve
c. accumulator
d. all of the above

44. Which of the following systems generate more energy when used in industrial applications?
a. hydraulic systems
b. pneumatic systems
c. both systems generate same energy
d. cannot say

45. Which type of compressor requires a reservoir for compressed air and why?
a. rotary compressor to avoid pulsating effect
b. reciprocating compressor to avoid pulsating effect
c. both rotary and reciprocating compressors to avoid pulsating effect
d. none of the above

46. Which of the following factors is/are considered while selecting a compressor?
a. type of oil filter required
b. volumetric efficiency
c. viscosity of the liquids used
d. all of the above

47. Which of the following is a component used in air generation system?
a. pressure switch
b. pressure gauge
c. drier
d. intercooler

48. Which of the following notations is used to represent a regulator unit?
a. 3.0
b. 0.3
c. 3
d. none of the above

49. Which of the following logic valve is known as shuttle valve?
a. OR gate
b. AND gate
c. NOR gate
d. NAND

50. In pneumatic systems, AND gate is also known as
a. check valve
b. shuttle valve

c. dual pressure valve
d. none of the above

51. What is a pressure sequence valve?
a. it is a combination of adjustable pressure relief valve and directional control valve
b. it is a combination of nonadjustable pressure relief valve and directional control valve
c. it is a combination of adjustable pressure reducing valve and check valve
d. it is a combination of adjustable pressure reducing valve and flow control valve

52. Overlapping of signals in pneumatic systems can be avoided by using
a. rolling lever valve
b. idle roller lever valve
c. both a. and b.
d. none of the above

53. Pneumatic systems usually do not exceed:
a) 1 hp
b) 1 to 2 hp
c) 2 to 3 hp
d) 4 to 5 hp

54. Most hydraulic circuits:
a) Operate from a central hydraulic power unit
b) Use air-over-oil power units
c) Have a dedicated power unit
d) Does not have dedicated power unit

55. The lubricator in a pneumatic circuit is the:
a) First element in line
b) Second element in line
c) Last element in line
d) Third element in line

56. Which of the following factors is/are considered while selecting a compressor?
(a) Types of filter required (c) Viscosity of the liquids used
(b) volumetric efficiency (d) All of these

57. Which of the following is a component used in air generation system?
(a) Pressure switch (c) Drier
(b) Pressure gauge (d) Intercooler

58. Which of the following notations is used to represent a regulator unit?
(a) 3.0 (b) 0.3 (c) 3 (d)None of these

59. Overlapping of signals in pneumatic systems can be avoided by using
(a) rolling lever valve (c) both a and b
(b) idle roller lever valve (d) none of these

60. Heavy lifting work is often accomplished by shifting fluids in big machines. The power system of such machines can be described as:
(a) Reciprocating (c) Hydraulic
(b) Pneumatic (d) Hybrid

61. The scientific principle that makes hydraulic system possible is
(a) Pascal's Principle (c) Bernoulli's principle
(b) Boyle's principle (d) the fluid flow principle

62. Pneumatic and other power system can support three kinds of motion, they are ;
(a) Linear, reciprocating and random motion
(b) Linear, flowing and rotary motion
(c) Linear, zigzag and spiral motion

(d) Linear, reciprocating and rotary motion

63. Fluid power circuits use schematic drawings to :
(a) simplify component
(b) Make it so only trained persons can understand the functions
(c) Make the drawing look impressive
(d) Make untrained person to understand

64. A pneumatic symbol is :
(a)Different from a hydraulic symbol used for the same function
(b)The same as a hydraulic symbol used for the same function
(c)Not to be compared to a hydraulic symbol used for the same function
(d)None of the mentioned

65. A pneumatic system usually do not exceed:
(a) 1 hp (b) 1 to 2 hp (c)2 to 3 hp (d) 4 to 5 hp

66. Most hydraulic circuits:
(a) Operation from a central hydraulic power unit
(b) use air-over-oil power units
(c) Have a dedicated power unit
(d) Does not have dedicated power unit

67. Hydraulic and pneumatic circuits:
(a) Perform the same way for all functions
(b) Perform differently for all functions
(c) Perform the same with some exceptions
(d) Does not perform all the functions

68. The lubricator in a pneumatic circuit is the :
(a) first element in line (c) last element in line
(b) second element in line (d) third element in line

69. When comparing first cost of hydraulic system to pneumatic system, generally they are:
(a) More expensive to purchase (c) Cost is same
(b) Less expensive to purchase (d) Cost is not required

70. The most common hydraulic fluid is :
(a) Mineral (b) synthetic fluid (c) water (d) gel

Answer : **HYDRAULIC & PNEUMATICS**

1-a	2- c	3-d	4-b	5-b	6-d	7-d
8-d	9-d	10-c	11-a	12-c	13-a	14-d
15-a	16-b	17-c	18-a	19-a	20-d	21-a
22-c	23-a	24-a	25-b	26-a	27-c	28-d
29-a	30-c	31-a	32-c	33-a	34-c	35-b
36-b	37-a	38-b	39-a	40-a	41-b	42-c
43-c	44-a	45-b	46-b	47-c	48-b	49-a
50-c	51-a	52-c	53-a	54-a	55-c	56-b
57-c	58-b	59-a	60-c	61-a	62-d	63-a
64-a	65-a	66-a	67-c	68-c	69-b	70-c

pH MEASUREMENT

1. Which of the following is the formula for pH calculation?
   a) log10[H+]
   b) -log10[H+]
   c) log2[H+]
   d) -log2[H+]
2. Pure water is known to be which of the following?
   a) Weak electrolyte
   b) Strong electrolyte
   c) Neither weak nor strong
   d) Not an electrolyte
3. Which of the following is the value of hydrogen ion concentration of pure water?
   a) 1×10^{7} moles/litre
   b) 1×10^{5} moles/litre
   c) 1×10^{6} moles/litre
   d) 1×10^{8} moles/litre

4. Which of the following is the value of hydroxyl ion concentration of pure water?
   a) 1×10^{7} moles/litre
   b) 1×10^{5} moles/litre
   c) 1×10^{6} moles/litre
   d) 1×10^{8} moles/litre
5. Which of the following is the relation between hydrogen and hydroxyl ion concentration of pure water?
   a) Value of hydrogen ion concentration is greater
   b) Value of hydroxyl ion concentration is greater
   c) They are both always the same
   d) The concentrations keep changing

6. The Nernst equation is given by which of the following statements?
   a) $E=E_o + 2.303\ RT/F \log CH$
   b) $E=E_o - 2.303\ RT/F \log CH$
   c) $E=E_o + 2.303\ RT\times F \log CH$
   d) $E=E_o - 2.303\ RT\times F \log CH$
   Answer: a

7. Which of the following is the relation between the concentration of hydrogen and hydroxyl ions in an acidic solution?
   a) Value of hydrogen ion concentration is greater
   b) Value of hydroxyl ion concentration is greater
   c) They are both always the same
   d) The concentrations keep changing

8. Which of the following is the relation between the concentration of hydrogen and hydroxyl ions in a basic solution?
   a) Value of hydrogen ion concentration is greater
   b) Value of hydroxyl ion concentration is greater
   c) They are both always the same
   d) The concentrations keep changing

9. pH meters can be considered as voltage sources with which of the following internal resistances?
   a) Very low resistance
   b) Moderate resistance

c) Very high resistance
d) No resistance

10. The electrodes used in pH measurement have which of the following internal resistances?
a) Very low resistance
b) Moderate resistance
c) Very high resistance
d) No resistance

11. Which of the following is not a failure in pH meters?
a) Defective electrodes
b) Defective input circuitry
c) Defective electronic circuitry
d) Defective calibration

12. Which of the following is the simplest of pH meters?
a) Null-detector type pH meter
b) Direct reading type pH meter
c) Digital pH meter
d) Modern pH meter

13. In which of the following ways can zero drift be reduced in pH meters?
a) Using filter
b) Giving zero adjustment arrangement
c) Keeping the input impedance high
d) Using balanced and differential amplifiers

14. Which of the following can be used to provide automatic temperature compensation?
a) Proper insulation
b) Calibration for different temperatures
c) Thermistor
d) Thermometer

15. Which of the following is not the characteristic of null-detector type pH meter?
a) It can be battery operated
b) It has less accuracy
c) It is easy to maintain
d) Its electronic circuits are simple

16. Which of the following is not the characteristic of direct reading type pH meters?
a) Simple operation
b) Quick to use
c) Continuous indication output
d) It requires balancing process

17. Which of the following is not the characteristic of chopper amplifier pH meter?
a) Direct voltage from the electrodes is chopped at the main frequency
b) Using choppers for high-input resistance gives rise to spikes of waveforms at the output
c) It leads to stability in DC output of phase-sensitive rectifier
d) Magnitude of surge increases in the glass electrode output

18. In which of the following ways can the disadvantages of chopper amplifier type pH meter be overcome?
a) Using zero corrected DC amplifier
b) Using modern design
c) Using digital design
d) Using vibrating condenser

19. The pH of a liquid solution is a measure of:
(A) Dissolved salt content
(B) Hydrogen ion activity
(C) Hydroxyl ion molarity
(D) Electrical conductivity
(E) Sodium ion molarity

20. A pH value less than 7.0 means that the solution is:
(A) Conductive
(B) Caustic
(C) Hot
(D) Acidic
(E) Alkaline

21. The Nernst equation relates:
(A) Reagent dosage to change in pH
(B) O2 concentration to latent heat
(C) Relative ion concentration to voltage
(D) Conductivity to fluid flow rate
(E) Partial vapor pressure to fluid density

22. Buffer solutions are used with pH probes for the purpose of:
(A) Cleaning
(B) Linearization
(C) Purging embedded sodium ions
(D) Electrode inspection
(E) Calibration

23. Flue gas oxygen measurement ("O2 trim") is important in combustion control systems for the purpose of:
(A) Reducing sulphur emissions
(B) Safer shut-downs
(C) Faster start-ups
(D) Reducing NOX emissions
(E) Minimizing burner noise

24. An aqueous solution has a hydrogen ion concentration of 0.0015 M. Calculate the pH of this solution.
(A) 2.824 pH
(B) 11.18 pH
(C) 2.292 pH
(D) 1.824 pH
(E) 2.897 pH

25. A chromatograph separates and distinguishes different molecule types in a fluid stream by:
(A) Emitted light spectra
(B) Atomic mass (weighing)
(C) Electric charge
(D) Adsorption time-delay
(E) Reverse osmosis

26. An electrode less or toroidal conductivity probe enjoys the following advantage over electrode-type conductivity probes:
(A) Smaller size
(B) Resists fouling
(C) Immunity to temperature changes
(D) Lower cost
(E) Greater sensitivity

27. According to the Nernst equation, the voltage developed by the electrodes will when temperature increases, all other factors remaining the same.

(a) Decrease
(b) Fluctuate
(c) Remain the same
(d) Increase

28. What is the pH value of very strong acid solution**?**
A. Less than 7
B. Less than 5
C. Less than 2
D. Less than zero

29. pH meters can be considered as voltage sources with which of the following internal resistance?
(a) Very low resistance (c) Very high resistance
(b) Moderate resistance (d) No resistance

30. the electrode used in pH measurement have which of the following internal resistance?
(a) Very low resistance (c) Very high resistance
(b) Moderate resistance (d) No resistance

31. Which of the following is not a failure in pH meters?
(a) Defective electrodes (c)Defective electronic circuitry
(b) Defective input circuitry (d) Defective calibration

32. Which of the following is the simplest of pH meters?
(a)Null detector type pH meter
(b)Direct reading type pH meter
(c)Digital pH meter
(d)Modern pH meter

33. Which of following is not the characteristics of null detector type pH meter?
(a)It can be battery operated (c)It is easy to maintain
(b)It has less accuracy (d)Its electronic circuits are simple

34. Which of the following is not the characteristics of direct reading type pH meters?
(a)Simple operation (c)Continuous indication output
(b)Quick to use (d)It requires balancing process

35. Which of the following is not the characteristic of chopper amplifier pH meter?
a) Direct voltage from the electrodes is chopped at the main frequency
b) Using choppers for high-input resistance gives rise to spikes of waveforms at the output
c) It leads to stability in DC output of phase-sensitive rectifier
d) Magnitude of surge increases in the glass electrode output

Answers: **pH MEASUREMENT**

1-b	2-a	3-a	4-a	5-c	6-a	7-a
8-b	9-c	10-c	11-d	12-a	13-d	14-c
15-b	16-d	17-c	18-d	19-b	20-d	21-c
22-e	23-d	24-a	25-d	26-b	27-d	28-d
29-c	30-c	31-d	32-a	33-b	34-d	35-c