Uka Tarsadia University(Diwaliba Polytechnic)
Diploma in Chemical Engineering
Objective Type Questions (Utilities & Instrumentation in Chemical Plant)

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UNIT 1 WATER AS BASIC UTILITY

1. Hardness of water is due to the presence of salts of _____
   a) Potassium
   b) Chlorine
   c) Magnesium
   d) Boron
2. Select the incorrect statement from the following option.
   a) Water which does not form lather with soap and forms white scum is called hard water
   b) Hard water contains dissolved calcium and magnesium salts in it
   c) In hard water, cleansing quality of soap is depressed
   d) Due to the presence of dissolved hardness-producing salts, the boiling point of water is depressed
3. Select the incorrect statement from the following option.
   a) Permanent hardness is due to dissolved chlorides and sulphates of calcium and magnesium
   b) It can be removed by mere boiling of water
   c) It is also known as non-alkaline hardness
   d) The difference between the total hardness and the alkaline hardness gives the non-alkaline hardness
4. Alkaline hardness is due to the presence of bicarbonate, carbonate and hydroxides of the hardness-producing metal ions.
   a) True
   b) False
5. Select the incorrect statement from the following option.
   a) The taste of hard water is better than soft water
   b) The dissolved calcium in hard water can help to produce strong teeth
   c) Hard water coats the lead piping with a layer of insoluble calcium carbonate which prevents poisonous lead dissolving in water
   d) Boiler feed water should also be hard in nature
6. Hardness of water is conventionally expressed in terms of equivalent amount of _____
   a) H_2CO_3
   b) $MgCO_3$
   c) $CaCO_3$
   d) $Na_2 CO_3$
7. Which of the following is not a unit of hardness?
   a) Parts per million

b) Degree centigrade
c) Degree clarke
d) Degree French

8. 1 ppm = _____
   a) 0.07 ^{0}Fr
   b) 0.7 ^{0}Fr
   c) 0.1 ^{0}Fr
   d) 0.01 ^{0}Fr
9. Water is mainly used in boilers for the generation of _____
   a) Power
   b) Electricity
   c) Steam
   d) Current
10. Which of the following is not a result of the excess of impurity in boiler-feed?
   a) Scale and sludge formation
   b) Decomposition
   c) Corrosion, priming and foaming
   d) Caustic embrittlement
11. If the precipitate formed is soft, loose and slimy, these are _____ and if the precipitate is hard and adhering on the inner wall, it is called _____
   a) Sludges, scale
   b) Scale, sludges
   c) Sludges, rodent
   d) Scale, rodent
12. The scales decrease the efficiency of boiler and chances of explosions are also there.
   a) True
   b) False
13. The propulsion of water into steam drum by extremely rapid, almost explosive boiling of water at the heating surface is called _____
   a) Foaming
   b) Priming
   c) Corrosion
   d) Caustic embrittlement
14. The phenomenon during which the boiler material becomes brittle due to accumulation of caustic substances is known as _____
   a) Foaming
   b) Priming
   c) Corrosion
   d) Caustic embrittlement
15. Foaming is caused by the formation of _____
   a) Acids
   b) Alcohols
   c) Oils and alkalis
   d) Ketones

16. What is the molecular formula of lime?
    a) $CaCO_3$
    b) $Al(OH)_3$
    c) $Ca(OH)_2$
    d) $Mg(OH)_2$
17. What is the molecular formula of soda?
    a) Na_2CO_3
    b) $Al_2(SO_4)_3$
    c) $Mg(OH)_2$
    d) $Ca(OH)_2$
18. Which of the following is not a precipitate in lime-soda process?
    a) $CaCO_3$
    b) $Fe(OH)_3$
    c) $Al(OH)_3$
    d) $Al_2(SO_4)_3$
19. Which of the following is not used as a coagulant in lime-soda process?
    a) Alum
    b) Calcium bicarbonate
    c) Aluminium sulphate
    d) Sodium aluminate
20. What is the function of coagulant?
    a) It helps in the formation of fine precipitate
    b) It helps in the formation of coarse precipitate
    c) It helps in increasing the solubility
    d) It helps in increasing the boiling point
21. In lime-soda process, no exchange of ions occurs.
    a) True
    b) False
22. The chemical formula of zeolite is _____
    a) $FeSO_4.7H_2O$
    b) $Al_2(SO_4)_3.18\ H_2O$
    c) $Na_2O.Al_2O_3.xSiO_2.yH_2O$
    d) Na_2Al_2O
23. Which of the following is not naturally occurring zeolite?
    a) Na^+
    b) Al^{+3}
    c) Si^{+4}
    d) Ca^{+2}
24. Natural zeolites are _____
    a) Porous
    b) Amorphous
    c) Non-durable
    d) Possess gel structure

25. Select the incorrect statement from the following option.
    a) The capital cost for zeolite process is high
    b) The residual hardness in zeolite process is 0-15 ppm
    c) The raw water used should be turbid and acidic
    d) Automation is possible in zeolite process
26. In zeolite process, the exchange of _____ takes place.
    a) Anions
    b) Cations
    c) Both cations and anions
    d) No ions exchange
27. Ion exchange process is also called as _____
    a) Permutit's process
    b) Demineralization
    c) Zeolite process
    d) Lime soda process
28. The operational cost of the ion exchange process is _____
    a) High
    b) Low
    c) Very high
    d) Very low
29. The hardness in the ion exchange process is reduced to _____
    a) 0-1ppm
    b) 0-2ppm
    c) 0-3ppm
    d) 0-4ppm
30. The total _____ are removed completely in the ion exchange process.
    a) Dissolved gases
    b) Dissolved solids
    c) Dissolved solvents
    d) Dissolved other impurities
31. In ion exchange process, the iron and manganese ions are removed from the water.
    a) True
    b) False
32. Water softened during _____ method will be ideal in boilers.
    a) Zeolite method
    b) Lime soda method
    c) Demineralisation method
    d) Permutit's process
33. Ion exchange process is the clean process because it has_____
    a) Sludge formation
    b) No sludge formation
    c) Little sludge is formed
    d) Other precipitates are formed

34. The regeneration of acids and alkalis in ion exchange process is _____
    a) Cheaper
    b) Costlier
    c) Time taking
    d) Hard process
35. In ion exchange process, the cation exchange resin is generated by passing _____
    a) Acids
    b) Dilute acids
    c) Alkalis
    d) Dilute alkalis
36. In case of the zeolites, ion exchange process do not function properly because of the _____
    a) Turbidity
    b) Suspended matter
    c) Turbidity and suspended matter
    d) Neither turbidity nor suspended matter
37. The continuous supply of soft water can be provided by having _____
    a) Storage facilities
    b) Required amount of ppm
    c) High pressure boilers
    d) 1ppm
38. The cost of the resins used in the ion exchange process is _____
    a) High
    b) Low
    c) Moderate
    d) Depends on water
39. The mineral free water is not used in _____
    a) Pharmaceuticals
    b) Cosmetics
    c) Explosives
    d) Drinking
40. _____ is the purest form of the water obtained by natural distillation.
    a) Under ground water
    b) Sea water
    c) River water
    d) Rain water
41. The colour and odour of the natural water is due to the presence of the _____
    a) Dissolved organic matter
    b) Mud
    c) Leaves
    d) Other dust particles
42. Surface water appears turbid due to presence of the _____ which remains suspended in the water.

a) Impurities
b) Oxygen
c) Nitrogen
d) Water plants

43. _____ water contains more soluble salts than the surface water.
a) Sea water
b) Rain water
c) Underground water
d) Tank water

44. Chemical composition of the lake water is _____
a) Constant
b) Not constant
c) Some times constant
d) Cannot be determined

45. The soft water contains the hardness of about _____
a) 0-45ppm
b) 0-55ppm
c) 0-65ppm
d) 0-75ppm

46. The PH value of the drinking water is about _____
a) 6.5-8.5
b) 5.5-6.5
c) 4.5-5.5
d) 3.5-4.5

47. The total hardness can be given by _____
a) Temporary + permanent hardness
b) Temporary – permanent hardness
c) Temporary * permanent hardness
d) Temporary/permanent hardness

48. Which of the following process does not remove the permanent hardness of water?
a) Lime-soda
b) Ion exchange process
c) Zeolite process
d) Heating

49. The water which form lather directly with the soap is called _____
a) Hard water
b) Soft water
c) Partially hard water
d) Very hard water

50. In domestic water treatment, after the primary treatment _____ is done.
a) Screening
b) Sedimentation
c) Aerobic process
d) Anaerobic process

51. When impurities are separated by the gravitation of settling particles, the operation is called _____
    a) Sedimentation with coagulant
    b) Plain sedimentation
    c) Secondary sedimentation
    d) Disinfection
52. Which process of water treatment is done to avoid floating debris, branches, trees or other large particles suspended in water?
    a) Screening
    b) Aeration
    c) Primary sedimentation
    d) Secondary sedimentation
53. What is the size of the coarse screen used in pretreatment of water?
    a) 25mm
    b) 50mm
    c) 75mm
    d) 100mm
54. What is formed when coagulant is added to water?
    a) Scum
    b) Soap
    c) Bubbles
    d) Floc
55. The chemical composition of Alum is _____
    a) $Al_2 (SO_4)_3.18H_2O$
    b) $Al_2 (SO_4)_2.18H_2O$
    c) $Al_3 (SO_4)_2.18H_2O$
    d) $Al_4 (SO_4)_3.18H_2O$
56. Why Magnesium carbonate is not commonly preferred as coagulant?
    a) It is expensive
    b) It does not remove color
    c) Formation of sludge
    d) The time required for floc formation is less
57. Which of the following statement is wrong regarding filtration?
    a) It removes fine particle
    b) It removes suspended solids not removed by sedimentation
    c) It does not remove turbidity
    d) It removes color
58. In which type of filter, rate of filtration is low?
    a) Slow sand filter
    b) Rapid sand filter
    c) Gravity filter
    d) Pressure filter
59. Which type of problem is caused in filter due to the accumulation of solids on the top surface of filter media?

a) Clogging
b) Air binding
c) Sand incrustation
d) Sand leakage

60. Sedimentation is a process using gravity to remove suspended solids from water.
a) True
b) False

61. The tanks built with mechanical means for continuous removal of solids being deposited by sedimentation are called _____
a) Clarifiers
b) Settling basins
c) Sedimentation tanks
d) Eco-pons

62. Sedimentation tank is also called as settling tank.
a) True
b) False

63. What is the accumulated layer at the bottom of the tank during water treatment?
a) Flocs
b) Sediment
c) Sludge
d) Sewage

64. A process of contact and adhesion whereby the particles of a dispersion form larger-size clusters is called _____
a) Coagulation
b) Flocculation
c) Suspension
d) Sedimentation

65. What is the chemical formula of aluminium sulphate?
a) $Al_2(SO_4)_3$
b) $Al(SO_4)_3$
c) $Al_2(SO_4)$
d) $Al(SO_4)$

66. What is the test used to select the type of coagulant required/
a) Bar test
b) Jar test
c) Stock test
d) Coagulant test

67. What does sand filter remove?
a) TDS
b) TSS
c) BOD
d) COD

UNIT 2: STEAM, AIR & INERT GASES

1. Saturated steam occurs at temperatures and pressures where steam (gas) and water (liquid) can coexist.
   a) True
   b) False
2. Superheated steam is created by further heating wet or saturated steam beyond the saturated steam point.
   a) True
   b) False
3. Which steam is mainly used in propulsion/drive applications such as turbines, and is not typically used for heat transfer applications.
   a) Wet steam
   b) Superheated steam
   c) Saturated steam
   d) Dry steam
4. Which steam is used for process heating
   a) Dry steam
   b) Superheated steam
   c) Saturated steam
   d) Unsaturated steam
5. _____is usually contains wetness from non-vaporized water molecules that are carried over into the distributed steam.
   a) Dry steam
   b) Superheated steam
   c) Saturated steam
   d) Unsaturated steam
6. Vacuum steam is the general term used for saturated steam at temperatures below 100°C.
   a) True
   b) False
7. Application of steam in industry is/are
   a) Heating/Sterilization
   b) Propulsion/Drive
   c) Motive
   d) All of above
8. Application of steam in industry is/are
   a) Cleaning
   b) Moisturization
   c) Humidification
   d) All of above
9. In food processing factories, refineries, and chemical plants steam is used as a
   a) Heating/Sterilization
   b) Propulsion/Drive
   c) Motive

d) Atomization

10. Thermal electric power plants that use _____ in their turbines.
    a) Superheated,
    b) Vacuum steam
    c) Saturated steam
    d) Unsaturated steam
11. Steam is used for moisturization in the production of paper, so that paper moving over rolls at high speed does not suffer microscopic breaks or tears.
    a) True
    b) False
12. How can we classify steam generators on the basis of application
    a) Utility steam generators
    b) Industrial steam generator
    c) Marine steam generator
    d) All of the mentioned
13. What is the critical pressure of steam?
    a) 221.2 bar
    b) 220 bar
    c) 120 bar
    d) 300 bar
14. An air preheater is installed
    a) Between the economiser and chimney
    b) Before the superheater
    c) Before the economiser
    d) None of the mentioned
15. The length of shell of a Locomotive boiler is
    a) 5 m
    b) 4 m
    c) 3 m
    d) 2 m
16. Which of the following statement is correct ?
    a) A simple vertical boiler has one fire tube.
    b) A fire tube boiler occupies less space than a water tube boiler, for a given power.
    c) Steam at a high pressure and in large quantities can be produced with a simple vertical boiler.
    d) All of the mentioned
17. The object of producing draught in a boiler is
    a) To discharge the gases of combustion to the atmosphere through the chimney
    b) All of the mentioned
    c) To exhaust the gases of combustion from the combustion chamber
    d) To provide an adequate supply of air for the fuel combustion
18. The natural draught is produced by
    a) Team jet
    b) Chimney

c) Centrifugal fan
d) None of the mentioned

19. Which of the following statement is wrong ?
a) Water tube boilers are internally fired.
b) Locomotive boiler is a water tube boiler.
c) La-mont boiler is a low pressure water tube boiler.
d) all of the mentioned

20. Which of the following boiler is best suited to meet the fluctuating demand of steam ?
a) Locomotive boiler
b) Lancashire boiler
c) Babcock and Wilcox boiler
d) Cornish boiler

21. Which of the following auxiliaries are not used in steam Generators?
a) Economiser
b) Burner
c) Fan
d) Stoker

22. The formation of scale boiler leads to
a) Decrease in efficiency of boiler
b) Increase in efficiency of boiler
c) Increase in heat transfer
d) Decrease in maintenance of boiler

23. What is the pH value of water permissible for boiler?
a) 0
b) 7
c) Slightly less than 7
d) Slightly more than 7

24. Which device used to separate condensate from the steam without letting steam escape?
a) Condenser
b) Steam valve
c) Steam trap
d) None of the above

25. What is the disadvantage of natural draught?
a) It has less life
b) It has more maintenance cost of cleaning and more capital cost to build the chimney
c) The available draught decreases with increasing outside air temperature
d) All of the mentioned

26. The natural draught in the steam generator depends upon
a) The air condition outside the chimney
b) The temperature of exhaust gases
c) Both of the mentioned
d) None of the mentioned

27. The purpose of super heater in a boiler is
a) To increase the temperature of saturated steam with increase in its pressure

b) To increase the temperature of saturated steam without increase in its pressure
c) To increase the temperature of feedwater for better efficiency
d) None of the mentioned

28. How is the natural draught produced for exhaust gases?
a) By using fan
b) By using chimney
c) By using gravity
d) None of the mentioned

29. What is the purpose of using economizer in the boiler?
a) To heat feed water by utilizing heat from exhaust gases
b) To heat feed water by utilizing some heat from superheated steam
c) To superheat steam
d) None of the mentioned

30. Comparing fire tube and water tube boilers, which boiler can produce comparatively higher pressure steam than another for the same capacity?
a) Fire tube boiler
b) Water tube boiler
c) Both can produce steam at same pressure for the same capacity
d) None of the mentioned

31. Fire-tube boilers are used in?
a) Industrial steam generators
b) Utility steam generators
c) Marine steam generators
d) None of the mentioned

32. Which of the following is not an advantage of a fire-tube boiler?
a) Low first cost
b) Reliability in operation
c) More draught required
d) Quick response to load changes

33. Which of these is a type of fire-tube boiler?
a) Externally fired
b) Internally fired
c) Both of the mentioned
d) None of the mentioned

34. Which of these is an externally fired boiler?
a) Package boiler
b) Scotch-marine boiler
c) Lancashire boiler
d) None of the mentioned

35. Which of the following is a type of internally fired boiler?
a) Package boiler
b) HRT boiler
c) Lancashire boiler
d) Locomotive type boiler

36. The function of the fusible plug installed in a furnace is?
    a) To detect excess current
    b) To detect excess heat
    c) To detect water level in the tube
    d) To detect water level in the shell
37. Which of the following gaseous fuels has the lowest calorific value?
    a) Refinery Gas
    b) Gobar Gas
    c) Converter Gas
    d) Blast Furnace Gas
38. Fuel gases containing hydrocarbons (e.g. coke oven gas) are not preheated before burning, mainly because
    a) There are chances of explosion during preheating
    b) It reduces its calorific value tremendously
    c) The hydrocarbons crack thereby choking and fouling the heat transfer surface by carbon soot
    d) It reduces its flame temperature tremendously
39. Flue gas discharge velocity through chimney of a big thermal power plant may be around _____ m/sec.
    a) 500
    b) 0.5
    c) 10
    d) 50
40. In water tube boilers
    a) Forced circulation takes place
    b) Water passes through the tubes which are surrounded by flames and hot gases
    c) The flames and hot gases pass through the tubes which are surrounded by water
    d) None of the mentioned
41. Rotary compressors are used where ____ quantities of gas are needed at relatively ____ pressure.
    a) Large, high
    b) Large, low
    c) Small, high
    d) Small, low
42. Rotary compressor can be classified as
    a) Displacement compressor
    b) Steady-flow compressor
    c) Both of the mentioned
    d) None of the mentioned
43. In steady-flow compressor, compression occurs by
    a) Transfer of kinetic energy
    b) Transfer of potential energy
    c) Trapping air
    d) All of the mentioned

44. In displacement compressor, compression occurs by
    a) Transfer of kinetic energy
    b) Transfer of potential energy
    c) Trapping air
    d) All of the mentioned
45. The rotary positive displacement machines are ____ and compression is ____
    a) Cooled, isothermal
    b) Uncooled, isothermal
    c) Cooled, adiabatic
    d) Uncooled, adiabatic
46. The Roots blower and vane-type compressor are the types of
    a) Displacement compressor
    b) Steady-flow compressor
    c) Both of the mentioned
    d) None of the mentioned
47. For a Root blower, as pressure ratio increases, efficiency ____
    a) Increases
    b) Decreases
    c) Remains constant
    d) None of the mentioned
48. The vane type compressor requires ____ the Roots blower.
    a) Equal work input
    b) More work input
    c) Less work input
    d) None of the mentioned
49. The centrifugal and axial flow compressor are the types of
    a) Displacement compressor
    b) Steady-flow compressor
    c) Both of the mentioned
    d) None of the mentioned
50. Which of the following is true for a centrifugal compressor?
    a) Rotation of impeller compresses the air
    b) Diffuser converts part of ke into internal energy
    c) Typical pressure ratio is around 1.4 to 1
    d) All of the mentioned
51. Which of the following is true for an axial-flow compressor?
    a) Blades are arranged in same manner as in reaction turbine
    b) Flow of air is along the axis of compressor
    c) Velocity of air changes when it passes through the blades
    d) All of the mentioned
52. For uncooled rotary compressor, compression process is ____ while ideal process is ____
    a) Isothermal, Adiabatic
    b) Isentropic, Adiabatic

c) Adiabatic, Isentropic
d) Adiabatic, Isothermal

UNIT 3: REFRIGERATION

1. Which device maintains a body at a temperature lower than the temperature of the surroundings?
   a) PMM1
   b) PMM2
   c) Refrigerator
2. What does a refrigerant do?
   a) Absorbs the heat leakage into body from surroundings
   b) Evaporates in the evaporator
   c) Absorbs latent heat of vaporization form the body which is cooled
   d) All of the mentioned
3. Coefficient of performance(COP) is defined as
   a) Heat leakage/work input
   b) Work input/heat leakage
   c) Latent heat of condensation/work input
   d) Work input/latent heat of condensation
4. Which device maintains a body at a temperature higher than the temperature of the surroundings?
   a) PMM1
   b) PMM2
   c) Refrigerator
   d) Heat pump
5. In a heat pump, there is heat leakage from the body to the surroundings.
   a) True
   b) False
6. What is the relation between COP of heat pump and refrigerator?
   a) COP of pump=COP of refrigerator – 1
   b) COP of pump=COP of refrigerator + 1
   c) COP of pump=COP of refrigerator – 2
   d) COP of pump=COP of refrigerator + 2
7. Heat leakage from a heat pump to surroundings is always greater than work done on pump.
   a) True
   b) False
8. Which of the following statements are true?
   a) A heat pump provides a thermodynamic advantage over direct heating
   b) COP for both refrigerator and pump cannot be infinity
   c) Work input for both refrigerator and pump is greater than zero
   d) All of the mentioned
9. Kelvin-Planck’s and Clausius’ statements are
   a) Not connected to each other
   b) Virtually two parallel statements of second law
   c) Violation of one doesn’t violate the other

d) None of the mentioned

10. If one of the Kelvin-Planck's or Clausius' statement is violated, then other is also violated.
    a) True
    b) False
11. In absorption refrigeration cycle, which of the following is used?
    a) Refrigerant
    b) Absorbent
    c) Both of the mentioned
    d) None of the mentioned
12. In absorption system, compressor in vapour compression cycle is replaced by absorber-generator assembly.
    a) True
    b) False
13. In the aqua-ammonia absorption system,
    a) Water is the refrigerant and ammonia is the absorbent
    b) Ammonia is the refrigerant and water is the absorbent
    c) Both ammonia and water can be used as refrigerant or absorbent
    d) None of the mentioned
14. Which of the following statement is true?
    a) Ammonia vapour is absorbed in water
    b) Boiling point of ammonia is more than that of water
    c) Both of the mentioned
    d) None of the mentioned
15. Why is an analyser-rectifier combination is used in absorption refrigeration cycle?
    a) To increase the amount of water vapour in ammonia vapour
    b) To decrease the amount of water vapour in ammonia vapour
    c) To eliminate the water vapour from ammonia vapour
    d) All of the mentioned
16. Which of the following condenses first?
    a) Ammonia vapour
    b) Water vapour
    c) Both condense at same temperature
    d) None of the mentioned
17. The vapour going to condenser is ____ in temperature and ____ in ammonia.
    a) Higher, less
    b) Higher, richer
    c) Lower, less
    d) Lower, richer
18. Lithium bromide-water vapour is another absorption refrigeration system.
    a) True
    b) False
19. Water is used as a ____ in air conditioning units.
    a) Absorbent

b) Refrigerant
c) Absorbent and refrigerant
d) None of the mentioned

20. The COP of absorption refrigeration system is
a) Low
b) High
c) Equal to that of vapour compression refrigeration system
d) None of the mentioned

21. In vapour refrigeration cycle, which of the following is used for expansion?
a) Expansion engine
b) Throttling valve or capillary tube
c) Both of the mentioned
d) None of the mentioned

22. Which of the following operations occur in a vapour refrigeration cycle?
a) Compression
b) Cooling and condensing
c) Expansion and evaporation
d) All of the mentioned

23. Compression can be
a) Dry compression
b) Wet compression
c) Both of the mentioned
d) None of the mentioned

24. Wet compression is preferred over dry compression.
a) true
b) false

25. Why is wet compression not preferred?
a) The liquid refrigerant can be trapped in the head of cylinder
b) This may damage the valves or cylinder head
c) Liquid refrigerant can wash away the lubricating oil thus accelerating wear
d) All of the mentioned

26. In the cooling and condensing, correct sequence of processes is
a) Desuperheated->condensed->saturated liquid
b) Desuperheated->saturated liquid->condensed
c) Condensed->desuperheated->saturated liquid
d) Saturated liquid->condensed->desuperheated

27. The expansion process is
a) Isentropic
b) Reversible
c) Adiabatic
d) All of the mentioned

28. The evaporation process is a
a) Constant volume reversible process
b) Constant pressure reversible process

c) Adiabatic throttling process
d) Reversible adiabatic process

29. The evaporator produces the cooling or refrigerating effect.
    a) True
    b) False
30. In the expansion process, which of the following remains constant?
    a) Work done
    b) Heat supplied
    c) Internal energy
    d) Enthalpy
31. The COP of cycle is given by(Q2=heat absorbed by evaporator and Wc=work done by compressor)
    a) 1- (Q2/Wc)
    b) 1- (Wc/Q2)
    c) Q2/Wc
    d) Wc/Q2
32. One tonne of refrigeration is given as the rate of heat removal from surroundings equivalent to heat required for melting one tonne of ice in a day.
    a) True
    b) False
33. Which of the following is recommended in a refrigeration cycle?
    a) Superheating of vapour
    b) Subcooling of liquid
    c) Both of the mentioned
    d) None of the mentioned
34. Superheating of vapour and subcooling of liquid ____ the refrigerating effect.
    a) Decreases
    b) Increases
    c) No change
    d) None of the mentioned
35. A condenser must ____ and then ____ the compressed refrigerant.
    a) Superheat, evaporate
    b) Desuperheat, evaporate
    c) Superheat, condense
    d) Desuperheat, condense
36. High _____ is an undesirable property for a good refrigerant.
    a) Specific heat
    b) Latent heat of vaporisation
    c) Viscosity
    d) Specific vapor volume
37. Fundamental principle of refrigeration is based on the _____ law of thermodynamics.
    a) Zeroth
    b) First

c) Second
d) Third

38. A refrigeration cycle is a reversed heat engine. Which of the following has the maximum value of the co-efficient of performance (COP) for a given refrigeration effect ?
    a) Vapor compression cycle using expansion valve.
    b) Air refrigeration cycle.
    c) Vapor compression cycle using expansion engine.
    d) Carnot refrigeration cycle.
39. In a working refrigerator, the value of COP is always
    a) 0
    b) < 0
    c) < 1
    d) 1
40. A refrigerator may be termed as a
    a) Heat pump
    b) Heat engine
    c) Carnot engine
    d) None of these
41. Out of the following refrigration cycles, which one has the minimum COP (Co-efficient of performance)?
    a) Air cycle
    b) Carnot cycle
    c) Ordinary vapour compression cycle
    d) Vapour compression with a reversible expansion engine

37. Out of the following refrigeration cycles, which one has maximum COP ?

    a) Air cycle
    b) Carnot cycle
    c) Ordinary vapor compression cycle
    d) Vapor compression with a reversible expansion engine
42. In jet refrigerators, the refrigerating fluid is practically always
    a) Water
    b) Ammonia
    c) Freon
    d) Brine
43. Which is not a refrigerant ?
    a) SO_2
    b) NH_3
    c) CCl_2F_2
    d) $C_2H_4C_{l2}$
44. Lowering of condenser temperature (keeping the evaporator temperature constant) in case of vapour compression refrigeration system results in
    a) Increased COP.

b) Same COP.
c) Decreased COP.
d) Increased or decreased COP ; depending upon the type of refrigerant.

45. Co-efficient of Performance (COP) of a refrigerator is the ratio of the
    a) Work required to refrigeration obtained.
    b) Refrigeration obtained to the work required.
    c) Lower to higher temperature.
    d) Higher to lower temperature.
46. A good secondary refrigerant should have the following features
    a) Non corrosive
    b) Inexpensive
    c) High specific heat
    d) All of above
47. Which one is secondary refrigerant
    a) Water
    b) Brine
    c) Both of above
    d) Ammonia
48. Refrigerant used should be such that its normal boiling point is
    a) Greater than the temperature required
    b) Less than the temperature required
    c) Equal to the temperature required
    d) None
49. Pressure of refrigerant in the evaporator should be
    a) Equal to the atmospheric pressure
    b) Less than the atmospheric pressure
    c) Greater than the atmospheric pressure
    d) None
50. Latent heat is highest for
    a) Refrigerant – 22
    b) Ammonia
    c) Water
    d) None
51. Specific heat at constant pressure is highest
    a) Refrigerant – 22
    b) Ammonia
    c) Water
    d) None
52. Specific heats at constant pressure and at constant volume are equal
    a) Vapor Refrigerant – 22
    b) Vapor Ammonia
    c) Water vapors
    d) None

53. Cp of air is
    a) > Cv of air
    b) = Cv of air
    c) < Cv of air
    d) None
54. Primary refrigerant is one which is sensibly
    a) Heated in the evaporator
    b) Cooled in the evaporator
    c) Neither heated in evaporator nor cooled in condenser
    d) None
55. Secondary refrigerant is one which is
    a) Cooled by the water
    b) Cooled by the air
    c) Cooled by the primary refrigerant
    d) None
56. Which one acts as a primary, secondary as well as a tertiary refrigerant
    a) Water
    b) Ammonia
    c) Freon-22
    d) None
57. Which one acts as a primary, secondary as well as a tertiary refrigerant
    a) Water
    b) Air
    c) Freon- 22
    d) None
58. Which is the primary refrigerant in central air conditioning plant
    a) Air
    b) Water
    c) Freon-22
    d) None
59. Which is the secondary refrigerant in central air conditioning plant
    a) Air
    b) Water
    c) Freon-22
    d) None
60. Which is the tertiary refrigerant in central air conditioning plant
    a) Air
    b) Water
    c) Freon-22
    d) None

61. Which is the secondary refrigerant in an ice plant
    a) Air
    b) Water
    c) Freon-22
    d) None
62. Which is the secondary refrigerant in an ice plant
    a) Mercury
    b) Brine solution
    c) Freon-22
    d) None
63. Which is the secondary refrigerant in an window air conditioner
    a) Water
    b) Brine solution
    c) Air
    d) None

UNIT 4: BASICS OF INSTRUMENTATION

1. An electrical transducer consists of _____
   a) 4 parts
   b) 6 parts
   c) 8 parts
   d) 2 parts
2. A transducer is part of a large circuit and produces the required output.
   a) True
   b) False
3. How many types of transducers are there?
   a) 2
   b) 4
   c) 6
   d) 8
4. Mechanical transducers sense _____
   a) electrical changes
   b) physical changes
   c) chemical changes
   d) biological changes
5. Mechanical transducers generate _____
   a) electrical signals
   b) chemical signals
   c) physical signals
   d) biological signals
6. Electrical transducers generate _____
   a) biological signals
   b) chemical signals
   c) physical signals
   d) electrical signals
7. Electrical signals are easy to amplify.
   a) True
   b) False
8. The power needs of electrical transducers is _____
   a) maximum
   b) minimum
   c) zero
   d) infinite
9. Electrical transducers are _____
   a) small and non-portable
   b) large and non-portable
   c) small and compact
   d) large and portable

10. Mechanical transducers cause _____
    a) power loss
    b) hysteresis loss
    c) eddy current loss
    d) frictional loss
11. Electrical transducers are costly.
    a) True
    b) False
12. Active transducers are classified into
    a) 4 types
    b) 2 types
    c) 6 types
    d) 8 types
13. Active transducers develop
    a) mechanical parameter
    b) electrical parameter
    c) chemical parameter
    d) physical parameter
14. How do passive transducers develop electrical signals?
    a) using a transformer
    b) using internal source
    c) using external source
    d) using a diode
15. Analog transducers convert input into
    a) voltage
    b) current
    c) digital
    d) analog
16. Inverse transducer converts electrical into a physical quantity.
    a) True
    b) False
17. Digital transducers produce analog output.
    a) True
    b) False
18. Accuracy is defined as the closeness that a reading approaches with respect to a standard value.
    a) True
    b) False
19. The output of a transducer must _____
    a) be different at different environment conditions
    b) be same at all environment conditions
    c) be same at some environment conditions
    d) be zero always

20. The output of a transducer must be _____
    a) low
    b) medium
    c) high
    d) zero
21. The size of a transducer must be _____
    a) infinite
    b) zero
    c) large
    d) small
22. A transducer must be _____
    a) quick in response
    b) slow in response
    c) medium in response
    d) very slow in response
23. The output of a transducer must _____
    a) be less reliable
    b) be highly reliable
    c) not be reliable
    d) be of medium reliability
24. The range of a transducer is _____
    a) Medium
    b) Narrow
    c) Large
    d) Zero
25. The sensitivity of an electrical transducer is obtained by dividing the electrical output with respect to unit change in the physical quantity.
    a) True
    b) False
26. The desirable static characteristics of a measuring system are
    a) Accuracy and resproducibility
    b) Accuracy, sensitivity and reproducibility
    c) Drift and dead zone
    d) Static error
27. The ratio of maximum displacement deviation to full scale deviation of the instrument is called
    a) Static sensitivity
    b) Dynamic deviation
    c) Linearity
    d) Precision or accuracy
28. In a measurement, what is the term used to specify the closeness of two or more measurements?
    a) Precision
    b) Accuracy

c) Fidelity
d) Threshold

29. Accuracy and Precision are dependent on each other.
    a) True
    b) False
30. In a measuring system quantity under measurement is termed as _____
    a) Measurand
    b) Controllers
    c) Sensors
    d) Indicators
31. Tacho generators are _____
    a) Zero-order system
    b) First-order system
    c) Second order system
    d) None of the mentioned
32. Transient response analysis is done for_____ systems.
    a) Unstable
    b) Stable
    c) Conditionally stable
    d) Marginally stable
33. Standard test signals in control system are:
    a) Impulse signal
    b) Ramp signal
    c) Unit step signal
    d) All of the mentioned
34. The nature of transient response is revealed by _____
    a) Sine wave
    b) Cos wave
    c) Tan wave
    d) Test signals
35. It is generally used to analyze the transient response to one of the standard test signals.
    a) True
    b) False
36. Ramp input
    a) Denotes constant velocity
    b) Value increases linearly with time
    c) It denotes constant velocity and varies linearly with time
    d) It varies exponentially with time
37. First order system is defined as :
    a) Number of poles at origin
    b) Order of the differential equation
    c) Total number of poles of equation
    d) Total number of poles and order of equation

38. Which of the following is not a dynamic property?
    a) frequency response
    b) saturation
    c) settling time
    d) response time
39. Which of the following is not a static property?
    a) repeatability
    b) hysteresis
    c) frequency response
    d) saturation
40. Type 0 systems are unsuitable _____
    a. For ramp inputs
    b. If the input is parabolic in nature
    c. Both a and b
    d. None of the above
41. A measuring system consists of
    a) Sensors
    b) Variable conversion elements
    c) Signal processing elements
    d) All of these
42. _____ are integrating instruments?
    a) Ammeters
    b) Voltmeters
    c) Wattmeters
    d) Ampere-hour and Watt-hour meters
43. Resistances can be measured with the help of a ……
    a) Wattmeter
    b) voltmeter
    c) ammeter
    d) ohmmeter and resistance bridge
44. Considering cost of instruments, which is a better choice, active or passive?
    a) Active instruments
    b) Passive instruments
    c) Cost of both active and passive instruments are approximately same
    d) None of these
45. Accuracy of measuring instrument indicates the
    a) Closeness of the output reading to the true value
    b) Ratio of output value to the input value
    c) Change in output with each change in input
    d) Degree of freedom from random errors
46. Precision of an instrument is defined as
    a) Closeness of output to the true value
    b) Change in output for every change in input
    c) Degree of freedom from random errors

d) Both (a) and (b)

47. An instrument with high precision implies
    a) High accuracy
    b) Low accuracy
    c) Does not imply anything about measurement accuracy
    d) None of these
48. For an instrument the degree of repeatability or reproducibility in measurements is an alternative way of expressing its
    a) Precision
    b) Accuracy
    c) Sensitivity
    d) Linearity
49. The sensitivity of a measurement is a measure of
    a) Change in instrument output when the quantity being measured changes by a given amount
    b) Closeness of output readings for the same input when there are changes in the method of measurement
    c) Ratio of output to the input
    d) Closeness of output reading of instrument to the true value
50. In an instrument torque/weight ratio is known as
    a) Sensitivity
    b) Accuracy
    c) Linearity
    d) Fidelity
51. If a balloon is equipped with temperature and altitude measuring instruments, then the order of the temperature measuring and altitude measuring instruments are
    a) Zero order, first order
    b) Both are first order instruments
    c) Both are zero order instruments
    d) First order, zero order

UNIT 5: MEASURING DEVICES

1. Reference points i.e., ice point and steam point in Reaumer temperature scale are respectively
   a) 273° & 80°
   b) 0° & 80°
   c) 32° & 460°
   d) 32° & 80°
2. Emf developed by a thermocouple while measuring a temperature of 800°C is about 31 mV. The type of thermocouple used is
   a) Chromel-alumel
   b) Iron-constantan
   c) Platinum-platinum+rhodium
   d) None of these.
3. For measuring the temperature of a red hot furnace, which is the most suitable instrument ?
   a) Platinum resistance thermometer
   b) Thermocouple
   c) Optical pyrometer
   d) Bimetallic thermometer
4. Which of the following is not a composition measuring instrument ?
   a) Thermal conductivity cell
   b) Mass spectrometer
   c) Polarograph
   d) Hot wire anemometer
5. Change of angle of refraction with composition comprises the working principle of a
   a) Polarimeter
   b) Polarograph
   c) Spectrometer
   d) Refractrometer
6. Which of the following instruments is not used for measuring sub-zero (<0°) temperatures ?
   a) Platinum resistance thermometer
   b) Mercury in glass thermometer
   c) Vapor pressure thermometer
   d) Radiation pyrometer
7. Which of the following is not suitable for measuring the temperature of a red hot object in the range of 800 - 1600°C ?
   a) Optical pyrometer
   b) Radiation pyrometer
   c) Photoelectric pyrometer
   d) Thermocouples
8. Dome temperature of blast furnace stove is most accurately measured by a
   a) Radiation pyrometer.

b) Platinum-platinum/rhodium ther-mocuple.
c) Iron-constantan thermocouple.
d) Platinum resistance thermometer.

28. Working principle of mercury in glass thermometer is
a) Volumetric expansion.
b) Pressure rise with temperature.
c) Linear expansion.
d) None of these.

9. Which of the following can measure temperatures in the range of - 20 to 300°C ?
a) Mercury in glass thermometer
b) Vapor pressure thermometer
c) Resistance thermometer
d) None of these.

10. Which of the following is the formula for pH calculation?
a) log10[H+]
b) -log10[H+]
c) log2[H+]
d) -log2[H+]

11. 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

12. 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

13. 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

14. The measurement of hydrogen ion concentration can be made by measuring the potential developed in an electrochemical cell.
a) True
b) False

15. 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

16. 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

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

18. 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

19. 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

20. Continuous measurement of specific gravity of a liquid is done by
a) Hydrometer
b) Contact-type electric indicators
c) Displacement meter
d) Both (a) and (c)

21. Psychrometer determines the
a) Humidity of gases
b) Moisture content of solids
c) Water of crystallisation
d) Hygroscopic nature of solids

22. Stroboscope is used for the measurement of
a) RPM of a flywheel
a) Frequency of light
b) Depression of freezing point
c) Liquid level under pressure

23. Continuous measurement of moisture content of paper in paper industry is done by measuring the
a) Thermal conductivity through the paper
b) Electrical resistance through the paper
c) Magnetic susceptibility
d) None of these

24. A manometer measures the _____ pressure.
a) Atmospheric
b) Absolute
c) Gauge

d) None of these

25. Normal mercury thermometer can be used to measure a temperature of about 300°C. However, its maximum temperature measurement range can be increased upto about 500°C by
    a) Filling nitrogen under pressure in the stem.
    b) Increasing the diameter of the tube.
    c) Using steel tube in place of glass tube.
    d) Accounting for the tube expansion.
26. Minute depression of freezing point of a liquid solvent on addition of a solid solute can be best measured by a
    a) Beckman thermometer
    b) Dilatometer
    c) Mercury thermometer
    d) Bimetallic thermometer
27. . Temperature of _____ can not be measured by an optical or radiation pyrometer.
    a) Hot blast (air) from stoves
    b) Molten slag flowing out of blast furnace
    c) Combustion space in boilers
    d) Rotary limestone calcination kiln
28. Temperature of molten pig iron (1450°C) and molten slag (1500°C) flowing out of a blast furnace is measured by a/an
    a) Chromel-alumel thermocouple
    b) Optical pyrometer
    c) Radiation pyrometer
    d) Either (b) or (c)
29. . Mercury thermometer is commonly used for low temperature measruement. The freezing point and boiling point of mercury are respectively _____ °C.
    a) 39 and 350
    b) 51 and 439
    c) 79 and 395
    d) 10 and 425
30. Which of the following thermocouples has the least temperature measurement range?
    a) Copper-constantan
    b) Chromel-alumel
    c) Platinum-platinum/rhodium
    d) Iron-constantan
31. Composition of natural gas is determined by the
    a) Haldane apparatus
    b) Mass spectrometer
    c) Chromatograph
    d) Both (b) and (c)
32. Radiation pyrometers as compared to thermocouples
    a) Has a slower speed of response.
    b) Can measure higher temperature.

c) Can't measure the temperature of moving objects.
d) Is more affected by corrosive atmosphere.

33. Photoelectric pyrometers are suitable in the temperature range of _____ °C.
a) 400-1600
b) 800-1600
c) 800-2500
d) 400-1000

34. Non-metallic diaphragm used as pressure sensor in instruments is generally made of
a) Teflon
b) Synthetic rubber
c) Bakelite
d) Thick paper

35. Hot wire anemometer is used for the measurement of
a) Flow rates of fluids.
b) Flow rates of granular solids.
c) Very high temperature.
d) Thermal conductivity of gases.

36. "An emf of the order of mV is generated when two solutions of different hydrogen ion concentration are separated by a thin glass wall". This is the working principle of a
a) pH meter
b) Polarimeter
c) Chromatograph
d) Polarograph

37. Bourdon tube is never made of
a) Phosphor bronze
b) Monel metal
c) Stainless steel
d) Cast iron

38. Mcleoid gauge is used to measure the
a) Point velocity
b) Flow rate
c) Vacuum
d) Pressure

39. Bimetal strips are not used in
a) Bimetallic thermometers.
b) Thermocouples.
c) Thermostats.
d) Relays for opening & closing of electrical circuits.

40. Which of the following is not a variable area flow meter ?
a) Piston type meter
b) Rotameter
c) Magnetic flow meter
d) Orifice and tapered plug meter

41. With increase in temperature, the electrical conductivity of the platinum used in the

resistance thermometer

a) Increases
b) Decreases
c) Remains constant
d) Increases exponentially

42. Sub-zero temperature (< 0°C) can be measured by a constant volume gas thermometer employing

a) Helium
b) Nitrogen
c) Hydrogen
d) None of these

43. Which of the following is not classified as a thermo electric pyrometer ?

a) Resistance thermometer.
b) Thermocouple.
c) Optical pyrometer (disappearing filament type)
d) Radiation pyrometer

44. The pressure sensing element of elastic type pressure gauge is never made in the form of

a) Bellow
b) Diaphragm
c) Strip
d) Bourdon tube

45. The level of a liquid under pressure can be determined using

a) Bubbler system
b) Differential pressure manometer
c) Diaphragm box system
d) Air-trap system

46. Working principle of radiation pyrometer is based on the

a) Wien's law
b) Kirchoffs law
c) Stefan-boltzman law
d) Seebeck effect

47. Liquid levels in autocalves are measued by

a) Simple float
b) Differential float type manometer
c) Glass gauge
d) None of these

48. Thermal wells used in temperature measurements should have

a) Very thick walls.
b) Low emissivity.
c) Polished surface.
d) High transmissivity of radiation.

49. Which is the most suitable instrument for measuring pressure below 3 microns ?

a) Mcleoid gauge
b) Alphatron

c) Ionisation gauge
d) Bourdon guage

50. Bourdon gauges are used for measuring pressure (kg/cm2)
a) < atmospheric
b) 2 (gauge)
c) < 2 (gauge)
d) 10 (absolute)

51. An aneroid barometer measures the _____ pressure.
a) Atmospheric
b) Absolute
c) Vacuum
d) Gage

52. Pressure of 0.0001 absolute psi can be measured by _____ gauge.
a) Mcloid
b) Pirani
c) Thermocouple
d) None of these

UNIT 6: CONTROL VALVES, CONTROL LOOPS & CONTROL SYSTEM

1. The on-off controller is a.....system
   a) Digital
   b) Linear
   c) Non-linear
   d) Discontinuous
2. A controller is basically a.....
   a) Sensor
   b) Comparator
   c) Amplifier
   d) Clipper
3. The input to a controller is
   a) Sensed signal
   b) Error signal
   c) Desired variable value
   d) Signal of fixed amplitude not dependent on desired variable value
4. Which one of the following is a disadvantage of proportional controller?
   a) It destabilises the system
   b) It produces offset
   c) It makes response faster
   d) It has very simple implementation
5. What is the characteristic of a good control system?
   a) Sensitive to parameter variation
   b) Insensitive to input commands
   c) Neither sensitive to parameter variation nor sensitive to input commands
   d) Insensitive to parameter variation nor sensitive to input commands
6. A good control system has all the following features except
   a) Good stability
   b) Slow response
   c) Good accuracy
   d) Sufficient power handling capacity
7. A control system in which the control action is somehow dependent on the output is known as
   a) Closed loop system
   b) Semiclosed loop system
   c) Open system
   d) None of the above
8. The controller characteristics for on-off controller follow _____.
   a) Only one curve
   b) Two curves
   c) Four curves
   d) Unpredictable
9. On-off Control is also called as _____.

a) One position control
b) Two position control
c) Four position control
d) Half position control

10. Which of the following is/are the Continuous Control Mode/s used in control systems?
a) On-Off Control
b) Integral Control
c) Proportional Control
d) All of the above

11. In a control system output of the controller is given to
a) Final control element
b) Amplifire
c) Comparator
d) Sensor

12. Bimetallic thermostat is .....controller
a) On-off
b) Zero-term
c) One-term
d) Two-term

13. What is the function of a butterfly valve?
a) On/ off control
b) Flow regulation
c) Pressure control
d) Hydraulic control

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

15. The main purpose of a control valve positioner is to:
a) Alter the fail-safe status of the valve
b) Improve the precision of the valve
c) Alter the characterization of the valve
d) Increase transmitter accuracy

16. Cavitation in a control valve is caused by:
a) Process noise
b) Vibration in the piping
c) The von karman effect
d) A laminar flow regime
e) Pressure recovery

17. _____ is not a final control element.
a) Control valve
b) Potentiometer

c) Electro-pneumatic converter
d) Servomotor

18. Which of the motions in actuators are preferred:
    a) Translator
    b) Rotary
    c) Stationary
    d) Non-Stationary
19. Basic control loop will consist of:
    a) Signal converter, resistor, knob, and control valve
    b) Transducer, valve packing, hex-head wrench, and tubing
    c) Transmitter, controller, i/p transducer, and control valve
    d) Resistor, capacitor, terminal block, and battery
    e) Control valve, microprocessor, terminal block, and cables
20. In order for a control loop to work well under a wide range of conditions, it must possess:
    a) Calibration drift
    b) Hysteresis
    c) A very expensive transmitter
    d) Proper documentation
    e) Negative feedback
21. Which of the following is not a "final control element"?
    a) A pressure transmitter
    b) An electric motor
    c) A heating element
    d) A control valve
    e) A servo
22. In a process controller, "output" refers to:
    a) The target value for the measured variable
    b) The DC supply power to the transmitter
    c) The maximum value for the low-alarm point
    d) The command signal to the control valve
    e) The production quota for each work day
23. Identify which of the following is an example of a "primary sensing element":
    a) I/P transducer
    b) Instrument signal cable
    c) Control valve
    d) Diaphragm
    e) Digital controller
24. Which of the following is not a type of pressure sensing element?
    a) Bellows
    b) Bourdon tube
    c) Manometer
    d) Orifice plate
    e) Diaphragm

25. In a home heating system, room temperature is the:
    a) Process variable
    b) Setpoint
    c) Inferred variable
    d) Manipulated variable
    e) Error variable
26. PID controller is also known as
    a) Three term controller
    b) Proportional controller
    c) Wo term controller
    d) Our term controller
27. Another word for “pressure” is:
    a) pH
    b) Flow
    c) Density
    d) Force
    e) Head
28. Proportional controller:
    a) Introduces offset
    b) Increases bandwidth
    c) Increases margin of stability
    d) Reduces velocity constant
29. Controllers play the following role in control system:
    a) They amplify the signals going to the actuator
    b) They act on the error signal coming out of the summing junction and output a suitable to the actuator
    c) They try to reduce steady state error optimizes overshoot.
    d) All of the mentioned
30. The acronym DCS stands for:
    a) DeltaV Console Services
    b) Distributed Control System
    c) Direct Cascade Sequencing
    d) Differential Concentration Switch
    e) Digital Control System
31. Feedback control system is basically
    a) High pass filter
    b) Low pass filter
    c) Band pass filter
    d) Band stop filter
32. Feedback control systems are
    a) Insensitive to both forward and feedback path parameter changes
    b) Less sensitive to feedback path parameter changes than to forward path parameter changes

c) Less sensitive to forward path parameter changes than to feedback path parameter changes
d) Equally sensitive to forward and feedback path parameter changes

33. A *distributed control system (DCS)* is a specially designed automated control system that consists of geographically distributed control elements over the plant or control area.
    a) True
    b) False
34. DCS consists of a large number of local controllers in various sections of plant control area and are connected via a high speed communication network.
    a) True
    b) False
35. The term reset control refers to:
    a) Proportional
    b) Integral
    c) Derivative
    d) None of the above
36. The integral control:
    a) Increases the steady state error
    b) Decreases the steady state error
    c) Increases the noise and stability
    d) Decreases the damping coefficient
37. Which of the following system provides excellent transient and steady state response:
    a) Proportional action
    b) Proportional + Integral action
    c) Proportional + Differential action
    d) Proportional + Integral + Differential action
38. In a PID controller, the offset has increased. The integral time constant has to be ___ so as to reduce offset:
    a) Reduced
    b) Increased
    c) Reduced to zero
    d) None of the above
39. A direct acting controller is one whose output tends to increase as the measurement signal increases.
    a) True
    b) False
40. A reverse acting controller is one whose output tends to decrease as the measurement signal increases.
    a) True
    b) False
41. Flow control loop consists
    a) Flow Indicator - Orifice Meter
    b) Control Valve
    c) Flow Controller

d) All of the above

42. Temperature control loop consists
    a) Temperature Indicator
    b) Control Valve
    c) Temperature Controller
    d) All of the above
43. Level control loop consists
    a) Flow Indicator
    b) Control Valve
    c) Both a) and b)
    d) None of the above
44. Pressure control loop consists
    a) Pressure Indicator
    b) Control Valve
    c) Pressure Controller
    d) All of the above
45. Control Valve consists
    a) bonnet, trim
    b) actuator
    c) packing
    d) All of the above
46. A control valve is a valve used to control fluid flow by varying the size of the flow passage as directed by a signal from a controller.
    a) True
    b) False
47. PLC is known as
    a) Programmable Logic Controller
    b) Programmable Label Controller
    c) Programmable Level Circuit
    d) Programmable Large Controller
48. _____ of PLCs can be done in very little time.
    a) Programming
    b) Installation
    c) Commissioning
    d) All of the above
49. The PLC is used in _____.
    a) Machine tools
    b) Automated assembly equipment
    c) Moulding and extrusion machines
    d) All of the above
50. On-*Off control* is the simplest form of feedback *control*
    a) True
    b) False

51. A *PID controller* is an instrument used in industrial *control* applications to regulate temperature, flow, pressure, speed and other process variables.
    a) True
    b) False
52. A *control loop* is a process management system designed to maintain a process variable at a desired set point.
    a) True
    b) False
53. P-Controller does not compare desired or set point with actual value or feedback process value
    a) True
    b) False