177/2024

Maximum : 100 marks

Time : 1 hour and 30 minutes

1. Difference between the maximum and minimum limits of size is called :

(A) Range (B) Clearance

(C) Tolerance (D) Precision

2. The working surface of the dedendum is called :

(A) Flank (B) Backlash

(C) Tooth fillet (D) Tooth space

3. What is the least count of Micrometer?

(A) 0.01 mm (B) 0.1 mm

(C) 0.2 mm (D) 1.1 mm

4. Which of the following is generally used to calibrate slip gauges?

(A) Collimator (B) Micrometer

(C) Vernier Caliper (D) Interferometer

5. What type of flux is suitable for soldering?

(A) Ammonium Chloride (B) Hydro Chloric Acid

(C) Zinc Chloride (D) Rosin

6. A galvanometer in series with a high resistance is called :

(A) An energy meter (B) A watt meter

(C) A voltmeter (D) An ammeter

7. The capacity of a battery is expressed in terms of :

(A) Ampere hour rating (B) Current rating

(C) Voltage rating (D) All of the above

8. Which of the following is a ferromagnetic material?

(A) Nickel (B) Tungsten

(C) Aluminium (D) Copper

9. What is the purpose of a latching relay?

(A) To energize and De-energize the circuit

(B) To amplify the circuit signal

(C) To hold a circuit in a specific state

(D) To convert AC signal to DC signal

10. Three resistors of 2 ohms, 3 ohms and 5 ohms are connected in series. What is the potential difference across the 3 ohm resistor if the total voltage is 10 V?

(A) 5 V (B) 3 V

(C) 2 V (D) 10 V

11. The dynamic characteristic of measurement system is :

(A) Fidelity (B) Speed of response

(C) Dynamic error (D) All of the above

12. The time required by a measurement system to begin to respond to a change in the measurement is called :

(A) Dead time (B) Dead zone

(C) Threshold (D) Response time

13. The ionization gauge an instrument used for the measurement of :

(A) Very low pressure (B) High pressure

(C) Very high pressure (D) Medium pressure

14. An example of inverse transducer is :

(A) Thermocouple (B) Strain gauge

(C) RVDT (D) Piezo electric crystal

15. The principle of operation of LVDT is based on the variation of :

(A) Reluctance (B) Permeance

(C) Mutual inductance (D) Self inductance

16. Seismic transducer is used for measurement of :

(A) Pressure (B) Angular velocity

(C) Acceleration (D) Temperature

17. The rotation speed of a shaft can be measured using :

(A) Eddy current tachometer (B) Drag type tachometer

(C) Stroboscopic tachometer (D) All of the above

18. Pitot-static tube measures :

(A) Dynamic pressure

(B) Static pressure

(C) Total pressure

(D) Difference between total and static pressure

19. Standard range of pneumatic signal for transmission is :

(A) 0 to 20 PSI (B) 3 to 15 PSI

(C) 1 to 15 PSI (D) 0 to 15 PSI

20. Capacitive transducer used for :

(A) Level measurement (B) Displacement measurement

(C) Force measurement (D) All of the above

21. What is the RMS value of a sinusoidal AC voltage with a peak value of 100 V?

(A) Peak value (B) RMS value

(C) Zero (D) 707 times the peak value

22. The effective value of an alternating current is also known as :

(A) Peak value (B) RMS value

(C) Average value (D) Instantaneous value

23. Which of the following is true for AC electricity?

(A) It has constant magnitude

(B) It changes direction periodically

(C) It flows only in one direction

(D) It cannot be transmitted over long distances

24. If the frequency of an AV waveform is 50 Hz, what is its time period?

(A) 0.02 seconds (B) 0.05 seconds

(C) 0.2 seconds (D) 0.5 seconds

25. The time period of a waveform is the :

(A) Number of cycles per second

(B) Time taken for one complete cycle

(C) Maximum displacement of the wave

(D) Frequency multiplied by amplitude

26. The RMS value of a sinusoidal AC current with a peak value of 10 A is :

(A) 10 A (B) 7.07 A

(C) 5 A (D) 3.54 A

27. For a purely sinusoidal waveform, the RMS value is related to its peak value by :

(A) RMS = 0.5 × Peak (B) RMS = 0.707 × Peak

(C) RMS = 1.414 × Peak (D) RMS = 2 × Peak

28. In an RLC series circuit, the impedance is minimum at :

(A) Resonance (B) Half power frequency

(C) Peak current (D) Cut-off frequency

29. The phasor representation of AC quantities is used to represent :

(A) Amplitude only (B) Magnitude and phase

(C) Frequency only (D) Power only

30. The peak value of an AC waveform is 100 V. The RMS value is approximately :

(A) 70.7 V (B) 50 V

(C) 63.2 V (D) 90 V

31. Which of the following statements are correct in an open circuit test of a transformer?

(i) Rated voltage is applied to the high voltage winding

(ii) Rated voltage is applied to the low voltage winding

(iii) High voltage winding is kept open circuited

(iv) A watt meter, volt meter and ammeter are connected in high voltage winding

(A) Option (i) and (iii) are correct (B) Option (i) and (iv) are correct

(C) Option (ii) and (iv) are correct (D) Option (ii) and (iii) are correct

32. A 100 KVA transformer has a full load loss of 2 kW, the losses being equally divided between iron and copper losses. During a day, the transformer operates on full load for 3 hours, one half load for 4 hours, the output being negligible for the remaining day time. Assume the load is lighting load (Unity power factor load). Calculate the all-day efficiency :

(A) 94.7% (B) 97.1%

(C) 94.5% (D) 96.5%

33. Which of the following statement/s is/are correct for short circuit test of a transformer?

(i) Can be used to determine the R 0, X 0, I 0 of the transformer

(ii) SC test alone is required to predetermine the voltage regulation of transformer

(iii) Can be used to determine the R 01 or R 02 and Z 01 or Z 02

(iv) Full load copper loss can be determined

(A) Option (i), (iii) and (iv) are correct

(B) Option (ii), (iii) and (iv) are correct

(C) Option (iii) and (iv) are correct

(D) Option (i) and (ii) only correct

34. If K is the transformation ratio of the transformer, X_1 is the primary winding leakage reactance and X_2 is the secondary winding leakage reactance, what is the total leakage reactance of the transformer referred to secondary?

(A) $X_1 + \left(X_2 / K^2\right)$ (B) $\left(X_1 / K^2\right) + X_2$

(C) $K^2 X_1 + X_2$ (D) $X_1 + K^2 X_2$

35. K-factor of a transformer is the measure of :

(A) Ability of a transformer to handle non-linear loads

(B) Maximum capacity of the transformer

(C) Ratio of output to input voltage

(D) Ratio of change in output voltage from no load to full load

36. A 11 kV/230 V, 150 kVA, single phase 50 Hz transformer has a core loss of 1.62 kW and half load copper loss of 0.5 kW, Determine the kVA load for maximum efficiency?

(A) 135 kVA (B) 150 kVA

(C) 166.66 kVA (D) 140 kVA

37. Parallel operation of two or more single phase transformer which of the following conditions must be satisfied?

(i) The voltage ratings of both the primary and secondary should be identical

(ii) The percentage impedances should be equal in magnitude

(iii) With transformers having different kVA rating, the equivalent impedances should be directly proportional to the individual kVA rating to avoid circulating current

(iv) With transformers having different kVA rating, the equivalent impedances should be inversely proportional to the individual kVA rating to avoid circulating current

(A) Option (i), (ii) and (iii) are correct

(B) Option (i) and (ii) are correct

(C) Option (ii) and (iii) are correct

(D) Option (i), (ii) and (iv) are correct

38. The relative polarity of the primary and secondary at any instant must be known _____.

(A) To operates the transformer in parallel connection

(B) To separates the eddy current loss form core loss

(C) To calculate voltage regulation

(D) To find the breakdown voltage of the transformer

39. Which of the following statement is correct about the phasing out test on three phase transformer?

(i) The phasing out test on three phase transformer is conducted at the same supply voltage and frequency.

(ii) This test is conducted to find the rated output voltage of the transformer.

(iii) A small direct current is circulated in the primary winding with making and breaking arrangement.

(iv) This test cannot be possible with three phase transformer with inner connected star.

(A) Option (i), (ii) and (iv) are correct

(B) Option (iii) and (iv) are correct

(C) Option (i), (iii) and (iv) are correct

(D) Option (i) and (iii) are correct

40. Which of the following are the causes of third harmonics in a transformer?

(i) Balanced connected load in the transformer

(ii) High saturation of transformer core

(iii) The B-H curve of the core in transformer

(iv) Rate of change of frequency of applied voltage

(A) Option (i), (ii) and (iii) only correct

(B) Option (iii) and (iv) only correct

(C) Option (ii) and (iii) only correct

(D) Option (i), (ii) and (iv) only correct

41. A tunnel diode is :

(A) a very heavily doped PN junction diode

(B) a high resistivity PN junction diode

(C) a slow switching device

(D) used with reverse bias

42. The working of SMPS is based on :

(A) Frequency control principle

(B) Integral control principle

(C) Phase control principle

(D) Chopper control principle

43. The ripple factor of a bridge rectifier is :

(A) 0.482 (B) 0.812

(C) 1.11 (D) 1.21

44. In a Zener diode shunt voltage regulator the diode regulates so long as it is kept in _____ condition.

(A) forward (B) reverse

(C) loaded (D) unloaded

45. When emitter bypass capacitor in common-emitter amplifier is removed, its _____ considerably reduced.

(A) input resistance (B) output load resistance

(C) emitter current (D) voltage gain

46. Heartily oscillator uses :

(A) resistive feedback (B) inductive feedback

(C) capacitive feedback (D) none of the above

47. An op-amp possess :

(A) very large input resistance and very large output

(B) very large input resistance and very small output resistances

(C) very small input resistance very small output resistances

(D) very small input resistance and very large output resistance

48. Closed loop gain of a feedback amplifier is the gain obtained when :

(A) its output terminals are closed

(B) negative feedback is applied

(C) feedback loop is closed

(D) feedback of factor exceeds unity

49. MOSFET is a :

(A) voltage controlled device (B) current controlled device

(C) temperature controlled device (D) frequency controlled device

50. In which configuration (s) voltage gain of transistor amplifier is lowest _____.

(A) common emitter (B) common base

(C) common collector (D) common emitter and base

51. How many status flag are there in a flag register of 8085 microprocessor?

(A) 8 (B) 3

(C) 4 (D) 16

52. INTEL 8085 is a _____ bit microprocessor.

(A) 4 (B) 8

(C) 16 (D) 32

53. How many select lines are required for 8 : 1 multiplexer?

(A) 8 (B) 2

(C) 3 (D) 5

54. Which part of the CRT contains cathode?

(A) Focusing system (B) Electron Gun

(C) Screen (D) Control Electrode

55. What is the full form of IIL in logic family?

(A) Injection integrated circuit (B) Integrated injection circuit

(C) Integrated input circuit (D) None

56. The logic equation of an EX-NOR having A and B as input is

(A) $A'B + AB'$ (B) $A'B' + A'B$

(C) $A'B' + AB$ (D) $(AB + A'B')'$

57. A flip flop can store

(A) One bit of data (B) Two bits of data

(C) Three bits of data (D) 8 bits of data

58. Which of the following is not an analog-to-digital convertor?

(A) Dual slope convertor

(B) Successive approximation convertor

(C) Counter type

(D) R-2R Ladder

59. Recording on CD is done by using :

(A) Magnetic method

(B) Optical method

(C) Electrical method

(D) All of the above

60. The LCD digital display that is based on :

(A) Radiation of light

(B) Reflection of light

(C) Emission of light

(D) Transmission of light

61. Which of the statements is correct regarding the Reynolds number?

(A) Decreases with an increase in the average velocity of a flowing liquid

(B) Increases with an increase in the absolute viscosity of a flowing liquid

(C) Increases with an increase in the density of a flowing liquid

(D) Remains constant regardless of temperature changes in the flowing liquid

62. Choose the correct formula for calculating the flow rate Q through a V-notch weir :

(A) $Q = \frac{8}{15} C_d \tan\left(\frac{\theta}{2}\right) \sqrt{2g} H^{5/2}$

(B) $Q = \frac{8}{15} C_d \tan\left(\frac{\theta}{2}\right) \sqrt{2g} H^{2/5}$

(C) $Q = \frac{2}{3} C_d \tan\left(\frac{\theta}{2}\right) \sqrt{2g} H^{2/3}$

(D) $Q = \frac{2}{3} C_d \tan\left(\frac{\theta}{2}\right) \sqrt{2g} H^{3/2}$

63. Rotating vane flowmeters are most suitable for measuring flow in which of the following industries?

(A) The steel industry

(B) The chemical industry

(C) The food processing industry

(D) The petroleum industry

64. Identify the flowmeter that is not classified as an inferential type :

(A) Coriolis flowmeters

(B) Differential pressure flowmeters

(C) Vortex flowmeters

(D) Turbine flowmeters

65. Match the following :

P.	Variable head flow meters	W.	Swirl meter
Q.	Variable area flow meters	X.	Flow nozzle
R.	Vortex flow meters	Y.	Lobed impeller meter
S.	Positive displacement meters	Z.	Rotameter

(A) P – W, Q – X, R – Y, S – Z
(B) P – X, Q – Z, R – W, S – Y
(C) P – Z, Q – X, R – W, S – Y
(D) P – Z, Q – Y, R – X, S – W

66. Identify the odd one out among the following level measurement systems :

(A) Float based system
(B) Air purge system
(C) Liquid purge system
(D) Air bellows

67. Mercury U-tube manometers are best suited for measuring :

(A) small changes in liquid level
(B) large changes in liquid level
(C) very paid changes in liquid level
(D) any type of liquid level variation

68. An air purge system is typically used for measuring the level of :

(A) Viscous liquids
(B) Corrosive liquids
(C) Volatile liquids
(D) Cryogenic liquids

69. Which of the following statements is true regarding the hydrostatic pressure method for measuring liquid level in a closed tank?

(A) The method does not depend on the density of the liquid.
(B) The accuracy of this method is not affected by temperature variations in the liquid during measurement.
(C) The measured level is proportional to the height of the liquid column above the measurement point.
(D) The method is only suitable for open tanks and cannot be used in closed tanks.

70. Contaminant buildup primarily affects the performance of a capacitance level indicator by altering the :

(A) Conductivity of the liquid
(B) Distance between the sensor plates
(C) Dielectric constant between the sensor plates
(D) Area of the sensor plates

71. Among the following statement, which is/are correct about A Feed Forward controller?

(i) It can be used when there is a defined source of routine disturbances.

(ii) It can be used when there is a known source of routine disturbances.

(iii) It can be used to minimize the negative effects of the disturbance.

(A) Only (i) and (ii)

(B) Only (ii) and (iii)

(C) Only (i) and (iii)

(D) All of the above (i), (ii) and (iii)

72. Among the following statement, which is/are correct about the Rangeability of a control Valve?

(i) which expresses the ratio between the maximum flow rate through a fully open valve and the minimum controlled flow through the valve at the same differential pressure across the valve.

(ii) calculated as the percentage of the valve fully open divided by the percentage open position of the valve to give minimum controllable flow.

(iii) is independent of Valve Characteristic.

(A) Only (i) and (ii)

(B) Only (i) and (iii)

(C) All of the above (i), (ii) and (iii)

(D) Only (ii) and (iii)

73. Which of the following statement is/are wrong?

(i) Measured variable is indicated with the letter "r".

(ii) Controlled variable is indicated with the letter "b".

(iii) Setpoint is indicated with the letter "c".

(A) Only (i) and (ii)

(B) Only (i) and (iii)

(C) All of the above (i), (ii) and (iii)

(D) Only (ii) and (iii)

74. Reset rate is measured as

(A) Repeats per second

(B) Repeats per minute

(C) Resetting Speed

(D) Integral Time

75. The controller which anticipates error is :

(A) Derivative control

(B) Proportional control

(C) Integral control

(D) Proportional +integral control

76. Which of the following statement is/are wrong?

(i) Offset error can be eliminated by derivative control

(ii) Offset error can be eliminated by proportional control

(iii) Offset error cannot be eliminated by integral control

(A) Only (i) and (iii)

(B) Only (ii) and (iii)

(C) All of the above (i), (ii) and (iii)

(D) Only (i) and (ii)

77. The output of pneumatic controller is

(A) 3-15 psia

(B) 4-20 psig

(C) 4-20 psia

(D) 3-15 psig

78. Which of the following statements are true regarding cascade control?

(A) the controller output of one loop is determined by the set point of another loop

(B) the set point of one loop is determined by the controller output of another loop

(C) the set point of one loop is determined by the set point of another loop

(D) the set point of one loop is determined by the controller output of same loop

79. Two position control mode is best adapted to :

(A) Large scale system with Fast process rates

(B) Large scale system with Slow process rates

(C) Small scale system with Fast process rates

(D) Small scale system with Slow process rates

80. Which of the following statements are true regarding flashing?

(A) Valve outlet pressure is less than or equal to the vapour pressure of the process liquid

(B) Valve outlet pressure is greater than the vapour pressure of the process liquid

(C) Independent of vapour pressure

(D) None of the above

81. The temperature at which the celsius scale reading is equal to Fahrenheit :

(A) +40

(B) 32

(C) –32

(D) –40

82. Pyrometer is a technique for measuring temperature _____ the medium.

(A) Without contacting

(B) With contacting

(C) Using both methods

(D) None of these

83. Which of the following statement is/are true?

(i) J-type thermocouples consist of two wires made of iron and constantan alloy

(ii) J-type thermocouples consist of two wires made of copper and constantan alloy

(iii) J-type thermocouples are suitable for accurate measurements in the range of –190°C to 760°C

(iv) J-type thermocouples are suitable for accurate measurements in the range of –190°C to 1260°C.

(A) Only (ii) and (iii)
(B) Only (i) and (iii)
(C) Only (i) and (iv)
(D) Only (ii) and (iv)

84. Which of the following statement is/are true in the case of vapour pressure thermometer?

(i) The boiling point of the liquid must be below the lowest temperature to be measured.

(ii) The boiling point of the liquid must be above the lowest temperature to be measured.

(iii) The highest temperature to be measured must be above the critical pressure of the liquid.

(iv) The highest temperature to be measured must be below the critical pressure of the liquid.

(A) Only (i) and (iii)
(B) Only (ii) and (iii)
(C) Only (i) and (iv)
(D) Only (ii) and (iv)

85. The ratio of the amount of water vapour present in air/gas and the amount of water vapour in a saturated mixture at equal volume, temperature and pressure :

(A) Humidity
(B) Dew Point
(C) Latent heat
(D) Relative humidity

86. A force of 525 N is required to open a process control valve. What is the area of diaphragm needed for a diaphragm actuator to open the valve with a control gauge pressure of 75 KPa :

(A) 0.007 m^2
(B) 142.85 m^2
(C) 7 m^2
(D) 1.4285 m^2

87. An equal percentage valve has maximum flow of 50 cm^3/s and minimum of 2 cm^3/s. If full travel is 4 cm, find the flow at 2 cm opening :

(A) 20 cm^3/s
(B) 12.5 cm^3/s
(C) 10 cm^3/s
(D) 25 cm^3/s

88. For a Black body radiation, the total emitted radiation energy per second for all wavelengths increases with the _____ power of the temperature.

(A) Third
(B) Second
(C) Fourth
(D) Fifth

89. Which of the following statement is/are true in the case of PLC?

(i) can be programmed using Functional Block Diagram
(ii) can be programmed using Structured text
(iii) can be programmed using Ladder logic

(A) Only (i) and (iii)
(B) Only (ii) and (iii)
(C) Only (i) and (ii)
(D) All of the above (i), (ii) and (iii)

90. Which of the following statements are true regarding the HART protocol?

(i) can use Analog devices
(ii) can use Digital devices
(iii) can use devices manufactured by specific vendors

(A) Only (i) and (iii)
(B) Only (i) and (ii)
(C) Only (ii) and (iii)
(D) All of the above (i), (ii) and (iii)

91. Which of the following is not true with respect to switch (bridge) and router?

(A) Switches have to understand the network layer protocol being used to switch packets, whereas routers do not have to
(B) With a switch (bridge), the entire frame is transported on the basis of its MAC address, whereas with a router, the packet is extracted from the frame and the address in the packet is used for deciding where to send it.
(C) With a switch (bridge) network is segmented into different subnets with unique IP address range whereas router does not create subnets.
(D) Switch (bridge) manage traffic at the Medium Access Control address level whereas router manage traffic at the Internet Protocol Address level.

92. A PWM (Pulse Width Modulation) signal has a frequency of 1 kHz and a duty cycle of 50%. How much time does the signal remain high in one period?

(A) 0.2 ms
(B) 0.25 ms
(C) 0.5 ms
(D) 0.1 ms

93. In binary FSK-(Frequency Shift Keying) (BFSK), if "0" is represented by a frequency of 3000 Hz, and "1" by a frequency of 4000 Hz, what is the bandwidth of the signal approximately, given a data rate of 1000 bps?

(A) 4000 Hz (B) 3000 Hz

(C) 2000 Hz (D) 1000 Hz

94. Which of the following is true about the maintenance of memory blade cartridges in a server environment?

(A) They are permanently fixed and cannot be replaced

(B) They can be hot-swapped in some configurations

(C) They don't require any cooling

(D) They should be replaced every year

95. Which cable category has added shielding for reduced interference and is ideal for environments with high EMI (Electromagnetic Interference)?

	Cable Category	Shielding
(A)	CAT5e	Unshielded (UTP)
(B)	CAT6	Unshielded (UTP)
(C)	CAT6a	Unshielded (UTP)
(D)	CAT7	Unshielded (S/FTP)

96. Which statement is true regarding the scalability of a star topology in a computer network?

(A) Adding devices does not affect network performance

(B) It is difficult to add devices without impacting the network

(C) Adding devices only requires connecting them to the central hub

(D) Devices must be connected in a sequential order

97. In an industrial workstation, why might an HMI (Human Machine Interface) be configured with multiple layers or screens?

(A) To reduce initial system setup time

(B) To allow detailed monitoring of different subsystems without cluttering a single screen

(C) To speed up response times of all connected devices

(D) To enable direct hardware manipulation from the interface

98. In SCADA (Supervisory Control and Data Acquisition) systems, RTUs (Remote Transmitting Unit) often operate on a "store and forward" basis. What is the primary reason for this functionality?

(A) To increase the RTU's memory capacity

(B) To allow data to be temporarily stored and forwarded to other RTUs if the network is down

(C) To reduce data acquisition time

(D) To improve data security through delayed transmission

99. When an RTP (Remote Transmission Panel) loses connection with the central SCADA system, what commonly used feature helps retain critical data for transmission once the connection is restored?

(A) Temporary power supply

(B) Data encryption

(C) Direct device control

(D) Local storage (Buffering)

100. Which of the following statements is/are true with respect to ethernet?

(i) In Ethernet networks, the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) mechanism is essential for collision handling in full-duplex switched networks.

(ii) IEEE 802.1Q is a standard that allows Ethernet frames to carry VLAN identification information by adding a 32-bit header within the Ethernet frame.

(iii) In Ethernet, the term "back pressure" refers to a flow control method used in full-duplex networks to prevent buffer overflow by forcing the sender to pause.

(iv) ARP (Address Resolution Protocol) is essential in Ethernet networks for mapping IP addresses to MAC addresses, enabling IP communication within a local network segment.

(A) Only (ii) and (iii)

(B) Only (i) and (iv)

(C) Only (ii) and (iv)

(D) Only (i) and (iii)

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