CAT 2019 – INSTRUMENTATION

1. Pascal is the unit for

   (A) weight
   (B) pressure
   (C) conductivity
   (D) frequency

2. Which one of the following is necessary to observe interference?

   (A) Two sources of light of same frequency
   (B) Two sources of light with different frequencies
   (C) Two sources of light with same frequency and definite phase relationship
   (D) Two sources of light with different wavelengths

3. A superconducting material in the superconducting state is

   (A) paramagnetic
   (B) diamagnetic
   (C) ferromagnetic
   (D) None of the above

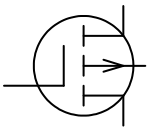
4. Josephson effect is associated with

   (A) tunneling of single electron
   (B) tunneling of electron pairs
   (C) normal current
   (D) None of the above

5. Double refraction is exhibited by

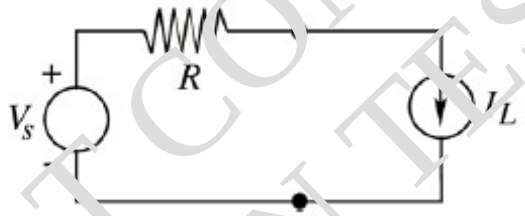
   (A) Water
   (B) NaCl
   (C) Calcite
   (D) Oxygen

6. The following symbol refers to



(A) FET
(B) n-channel MOSFET
(C) p-channel MOSFET
(D) None of the above

7. In the circuit shown below, V_S is a constant voltage source and I_L is a constant current load. The value of I_L that maximizes the power absorbed by the constant current load is



(A) $\frac{V_S}{4R}$

(B) $\frac{V_S}{2R}$

(C) $\frac{V_S}{R}$

(D) ∞

8. For a parallel *RLC* circuit, which one of the following statements is **NOT CORRECT**?

(A) The bandwidth of the circuit decreases if R is increased.
(B) The bandwidth of the circuit remains same if L is increased.
(C) At resonance, input impedance is a real quantity.
(D) At resonance, the magnitude of input impedance attains its minimum values.

9. The gain magnitude of 10 kHz, 60 dB/decade high-pass Butterworth filter for the 1 kHz signal would be

(A) – 20 dB
(B) – 40 dB
(C) – 60 dB
(D) – 80 dB

10. Filter that eliminates a narrow band of frequencies is referred as

(A) low pass filter
(B) high pass filter
(C) band pass filter
(D) notch filter

11. The wavelength of Helium-Neon Laser beam is

(A) 632.8 nm
(B) 452 nm
(C) 589.00 nm
(D) 380.00 nm

12. Ejection of electron in the innermost orbital leads to the emission of

(A) UV radiation
(B) IR radiation
(C) X-ray
(D) Visible radiation

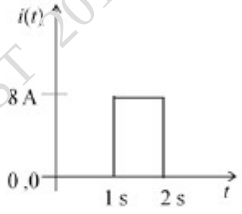
13. One electron volt is equivalent to

(A) 1.6×10^{-10} joule
(B) 1.6×10^{-13} joule
(C) 1.6×10^{-16} joule
(D) 1.6×10^{-19} joule

14. Ratio of equivalent capacitance of three capacitors of capacitance 8 μF, 12 μF and 24 μF connected in series to that of capacitors connected in parallel is

(A) 11:1
(B) 1:11
(C) 1:1
(D) 3:1

15. A current $i(t)$ shown in the figure below is passed through a 1 F capacitor that had zero initial charge. The voltage across the capacitor for $t > 2$s is



(A) 0 V
(B) 1 V
(C) 4 V
(D) 8 V

16. Efficiency of bridge rectifier is

(A) 20.3%
(B) 40.6%
(C) 60.9%
(D) 81.2%

17. The general formula for alkynes is

(A) C_nH_{2n+2}
(B) C_nH_{2n}
(C) C_nH_{2n-2}
(D) C_nH_{2n-1}

18. Which of the following contributes to the broadening of laser emission bandwidth?

(A) Doppler shift of moving atoms and molecules
(B) Amplification within the laser medium
(C) Coherence of the laser light
(D) Optical pumping of the laser transition

19. When a JFET is cut-off, the depletion layers are

(A) far apart
(B) close together
(C) touching
(D) conducting

20. In bipolar transistors, dc current gain is

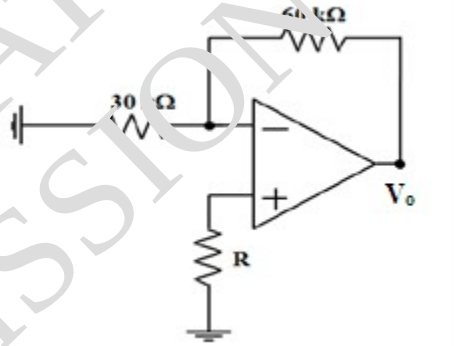
(A) $\frac{I_C}{I_E}$

(B) $\frac{I_C}{I_B}$

(C) $\frac{I_E}{I_B}$

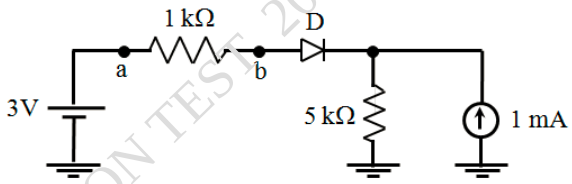
(D) $\frac{I_E}{I_C}$

21. In the circuit given below, each input terminal of the op amp draws a bias current of 10 nA. The effect due to these input bias currents on the output voltage V_o will be zero, if the value of R chosen is



(A) 20 kΩ
(B) 30 kΩ
(C) 60 kΩ
(D) 90 kΩ

22. Assuming the diode 'D' used in the circuit below is ideal, the voltage drop V_{ab} across the 1kΩ resistor is



(A) 5 V
(B) 3 V
(C) 2 V
(D) 0 V

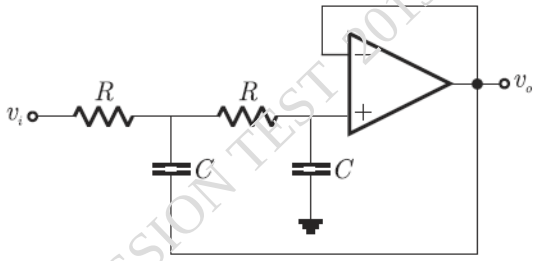
23. Norton's theorem states that a complex network connected to a load can be replaced with equivalent impedance

(A) in series with a current source
(B) in parallel with a voltage source
(C) in series with a voltage source
(D) in parallel with a current source

24. The parameter that indicates how fast the output of an **op** amp can vary for the input variations is

(A) slew rate
(B) unity gain bandwidth
(C) open loop gain
(D) offset voltage

25. The circuit in the figure is a



(A) low-pass filter
(B) high-pass filter
(C) band-pass filter
(D) band reject filter

26. Each valence electron in an intrinsic semiconductor establishes a

(A) covalent bond
(B) free electron
(C) hole
(D) recombination

27. Consider the following statements S1 and S2.

S1. The β of the bipolar transistor reduces if the base width is increased,

S2. The β of the bipolar transistor increases if the doping concentration in the base is increased.

Which remarks in the following is **CORRECT**?

(A) S1 is FALSE and S2 is TRUE
(B) Both S1 and S2 are TRUE
(C) Both S1 and S2 are FALSE
(D) S1 is TRUE and S2 is FALSE

28. Consider the following statements for metal oxide semiconductor field effect transistor (MOSFET). Which of the statements are **TRUE**?

P. As channel length reduces, OFF state current increases,

Q. As channel length reduces, output resistance increases

R. As channel length reduces, threshold voltage remains constant

S. As channel length reduces, ON current increases

(A) P and Q
(B) P and S
(C) Q and R
(D) R and S

29. A differential amplifier has a common mode gain of 0.02. It has 200 mV signals applied to each of the inputs. The amplitude of the output signal is

(A) 0 V
(B) 8 mV
(C) 4 mV
(D) None of the above

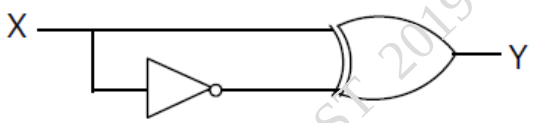
30. The term critical angle describes

(A) the point at which light is refracted
(B) the point at which light becomes invisible
(C) the point at which light has gone from the refractive mode to the reflective mode
(D) the point at which light has crossed the boundary layers from one index to another

31. How many semiconductor layers are in SCR?

(A) two
(B) three
(C) four
(D) six

32. The output Y of the logic circuit given below is



(A) '1'
(B) '0'
(C) X
(D) $\acute{X}$

33. Which one of the following is invalid state in an 8-4-2-1 binary coded decimal counter?

(A) 1 0 0 1
(B) 1 0 0 0
(C) 0 0 1 1
(D) 1 1 0 0

34. Which of the following types of ADC requires S/H?

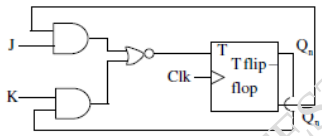
(A) Successive approximation type
(B) Integration type
(C) Flash
(D) Sigma Delta

35. The range of signed decimal numbers that can be represented by 6-bits 1's complement number is

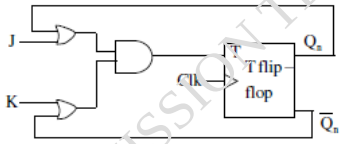
(A) – 31 to +31
(B) – 63 to +63
(C) – 64 to +63
(D) – 32 to +31

36. A JK flip-flop can be implemented by T flip-flop. Identify the correct implementation.

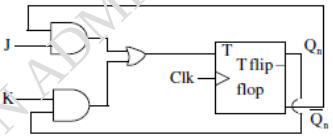
(A)



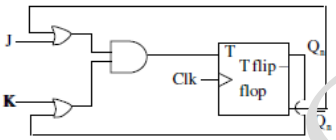
(B)



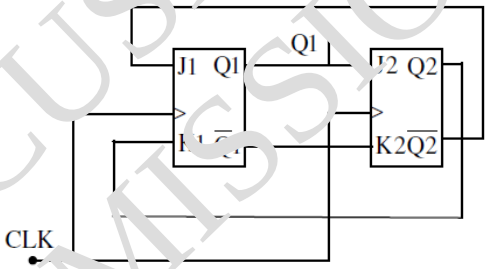
(C)



(D)



37. The outputs of two flip-flops Q1, Q2 in the figure shown are initialized to 0, 0. The sequence generated at Q1 upon application of clock signal is



(A) 01110 ……..
(B) 01010……..
(C) 00110…….
(D) 01100…….

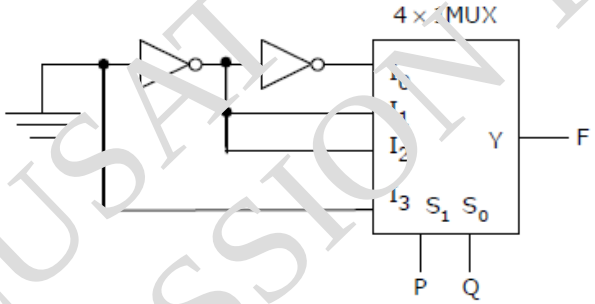
38. Decimal 43 in Hexadecimal and BCD number systems is respectively

(A) B2, 0100 011
(B) 2B, 0100 0011
(C) 2B, 0011 0100
(D) B2, 0100 0100

39. The 16-bit 2's complement form of an integer is 1111 1111 1111 0101. Its decimal representation is

(A) 10
(B) – 11
(C) – 10
(D) – 7

40 Which one of the logic gate function with P and Q inputs is implemented by the circuit shown below?



(A) AND
(B) OR
(C) XNOR
(D) XOR

41. In a Wheatstone bridge, each arm has a resistance R. One of the arms has a resistive sensor whose nominal resistance is also R and it changes to R + °R on environmental condition where °R << R. The bridge is excited by a dc voltage E_i. What is the output voltage on account of unbalance?

(A) $\left(\frac{\frac{\Delta R}{R}}{2+\frac{\Delta R}{R}}\right)E_i$

(B) $\left(\frac{\frac{\Delta R}{R}}{4+\frac{\Delta R}{R}}\right)E_i$

(C) $\left(\frac{2\frac{\Delta R}{R}}{4+\frac{\Delta R}{R}}\right)E_i$

(D) $\left(\frac{\frac{\Delta R}{R}}{4+2\frac{\Delta R}{R}}\right)E_i$

42. Match the Following:

P. Radiation Pyrometer	W. Angular velocity measurement
Q. Dall tube	X. Vacuum pressure measurement
R. Pirani gauge	Y. Flow measurement
S. Gyroscope	Z. Temperature measurement

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

43. In infrared spectroscopy, which one of the following frequency ranges is known as finger print region?

(A) 4000 – 2000 cm^{-1}
(B) 2000 – 1450 cm^{-1}
(C) 1450 – 500 cm^{-1}

(D) $500 - 200\ cm^{-1}$

44. In strain measurement, dummy strain gauges are used in bridge circuits for the purpose of

(A) calibration
(B) increasing sensitivity
(C) temperature compensation
(D) improving linearity

45. Which one of the following is used for signal conditioning of a piezoelectric type transducer?

(A) An instrumentation amplifier
(B) A trans-conductance amplifier
(C) A charge amplifier
(D) A logarithmic amplifier

46. An ac voltmeter is connected at the output of a LVDT and the LVDT is supplied with a sinusoidal voltage of amplitude 5 V and frequency 1 kHz. For a displacement of 1 mm from the null position, the voltmeter shows a reading of 2 V. What would be the reading of the voltmeter, if the displacement is 1 mm in the opposite direction from the null position?

(A) – 2 V
(B) – 0.2 V
(C) 0.2 V
(D) 2 V

47. Liquid flow rate is measured using

(A) Pirani gauge
(B) Pyrometer
(C) Orifice plate
(D) Bourdon tube

48. Poynting vector provides

(A) direction of polarization
(B) rate of energy flow
(C) intensity of electric field
(D) intensity of magnetic field

49. Which of the following diodes is used in switching circuits in microwave range?

(A) PIN diode
(B) Tunnel diode
(C) Varactor diode
(D) Gunn diode

50. Which one of the following instruments is more powerful to study the surface details of a specimen?

(A) Phase contrast microscope
(B) Scanning Electron Microscope (SEM)
(C) Transmission Electron Microscope (TEM)
(D) Light microscope

51. If L, D, ρ and R are respectively the length, diameter, resistivity and resistance of the strain gauge, the gauge factor of the strain gauge is defined as

(A) $\frac{\Delta L/L}{\Delta R/R}$
(B) $\frac{\Delta R/R}{\Delta L/L}$
(C) $\frac{\Delta R/R}{\Delta D/D}$
(D) $\frac{\Delta R/R}{\Delta \rho/\rho}$

52. A resistance potentiometer is a

(A) first order instrument
(B) zero order instrument
(C) second order instrument
(D) None of the above

53. Which of the following gauges measures absolute pressure in the range 10 to 10^{-6} torr?

(A) Pirani gauge
(B) Penning gauge
(C) Hot-cathode ionization gauge
(D) McLeod gauge

54. Superposition theorem is not applicable for

(A) current calculations
(B) voltage calculations
(C) power calculations
(D) reactance calculations

55. Consider the following statements S1 and S2:

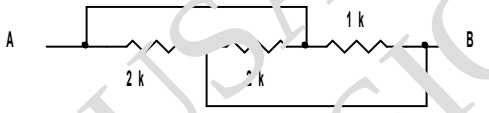
S1 : At the resonant frequency the impedance of a series *RLC* circuit is zero.

S2 : In a parallel *GLC* circuit, increasing the conductance *G* results in increase in its *Q* factor.

Which one of the following is **CORRECT**?

(A) S1 is FALSE and S2 is TRUE
(B) Both S1 and S2 are TRUE
(C) S1 is TRUE and S2 is FALSE
(D) Both S1 and S2 are FALSE

56. What is the equivalent resistance between points A and B in the network shown below?



(A) (2/3) k
(B) 1.5 k
(C) 0.5 k
(D) 2k

57. If the following program is executed in an 8085 microprocessor, at the end of the program the register A contains

Address	Instruction
2000H	XRA A
2001H	MVI B,04H
2003H	MVI A, 03H
2005H	RAR
2006H	DCR B
2007H	JNZ 2005
200AH	HLT

(A) 30H
(B) 60H
(C) 06H
(D) 03H

58. In which 'T' state, the 8085 microprocessor sends address to memory or I/O and activate 'ALE' signal?

(A) T1
(B) T2
(C) T3
(D) T4

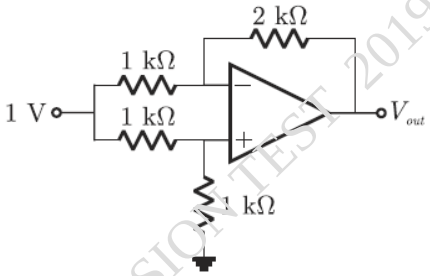
59. Consider the following 8085 interrupts.

(1) TRAP (2) INTR (3) RST 6 (4) RST 7.5 (5) RST 0

Software interrupts in the above are

(A) 1 and 3 only
(B) 2 and 5 only
(C) 3 and 5 only
(D) 1, 2, 3, 4 and 5

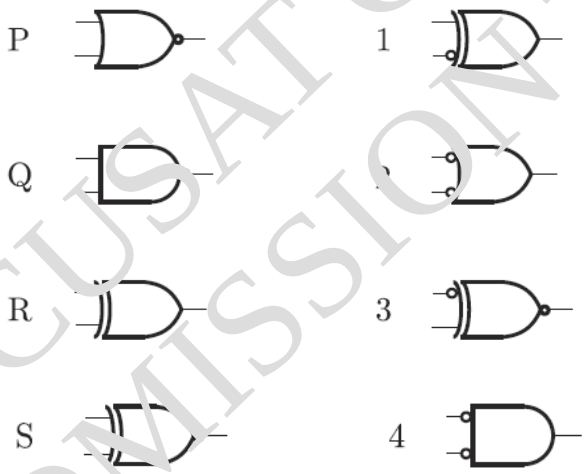
60. For the **op** amp circuit shown in the figure, V_o is



(A) – 2 V
(B) – 1 V
(C) – 0.5 V
(D) 0.5 V

61. Match the logic gates in column A with their equivalents in column B.

Column A **Column B**



(A) P-2, Q-4, R-1, S-3
(B) P-4, Q-2, R-1, S-3
(C) P-2, Q-4, R-3, S-1
(D) P-4, Q-2, R-3, S-1

62. The Boolean expression $(\acute{A}+\acute{B}+\acute{C})$ is equal to

(A) $(A.B.C)$
(B) $(A+B+C)$
(C) $(\acute{A}+\acute{B}+\acute{C})$
(D) $(A+\acute{B}+C)$

63. Which one of the following statements is **CORRECT**?

(A) BJT and MOSFET are current controlled devices
(B) BJT is voltage controlled and MOSFET is current controlled devices
(C) BJT and MOSFET are voltage controlled devices
(D) BJT is current controlled and MOSFET is voltage controlled devices

64. Which of the following motors uses brushes?

(A) ac induction motor
(B) dc motor
(C) stepper motor
(D) servomotor

65. Identify the sensor used in angular displacements.

(A) RTD
(B) LVDT
(C) Piezoelectric sensors
(D) Potentiometer

66. Which one of the following codes is normally used in a digital linear displacement transducer?

(A) Binary code
(B) Binary coded decimal
(C) Gray code
(D) ASCII code

67. The Fourier transform $x(t)=e^{-at}u(-t)$, when $u(t)$ is unit step function,

(A) exists for any real value of 'a'
(B) does not exist for any real value of 'a'
(C) exists if any real value of 'a' is strictly negative
(D) exists if the real value of 'a' is strictly positive

68. For a vector $\vec{E}$, which one of the following statements is **NOT TRUE**?

(A) $\vec{\nabla}.\vec{E}=0$, $\vec{E}$ is called solenoidal
(B) $\vec{\nabla}\times\vec{E}=0$, $\vec{E}$ is called conservative
(C) $\vec{\nabla}\times\vec{E}=0$, $\vec{E}$ is called irrotational
(D) $\vec{\nabla}.\vec{E}=0$, $\vec{E}$ is called irrotational

69. Find out the wrong term in the number series given below.

3, 10, 27, 4, 16, 64, 5, 25, 125, ……

(A) 3
(B) 4
(C) 10
(D) 27

70. Two pipes A and B can fill a tank in 6 hours and 4 hours respectively. If they are opened on alternate hours and if pipe A is opened first, in how many hours, the tank shall be full?

(A) 4
(B) 5
(C) 4½
(D) 5½

71. Impulse is equal to change of

(A) velocity
(B) acceleration
(C) momentum
(D) energy

72. If **A**, **B**, **C** and **D** are vectors such that, **C** = **A** x **B**, and **D** = **B** x **A**, then the angle between the vectors **C** and **D** is

(A) 0°
(B) 90°
(C) 180°
(D) 270°

73. A box X contains 2 white and 4 black balls. Another box Y contains 5 white and 7 black balls. A ball is transferred from the box X to the box Y. Then the ball is drawn from the box Y. The probability that it is white is

(A) 16/39
(B) 14/39
(C) 12/39
(D) 9/39

74. Which of the following 'for' loop is not correct?

(A) `for(; x < 10 ;)`
(B) `for(;  ;  ;)`
(C) `for(;  ;)`
(D) `for (x=0 ; x != 123;)`

75. Consider the following 'C' Programme

```
#include<stdio.h>
#include<conio.h>
main()
{
     float a = 1.2345;
     printf("%x", a);
}
```

What is the output of the above 'C' programme?

(A) 0.2345
(B) 1.2345
(C) 1
(D) 0

76. The prefix 'tera' refers to which one of the following power of 10?

(A) 10^{12}
(B) 10^{9}
(C) 10^{6}
(D) 10^{3}

77. The amount of heat required to raise the temperature of a unit mass of a substance by 1°K is

(A) specific heat
(B) thermal capacity
(C) calories
(D) latent heat

78. A body is executing a simple harmonic motion. If 'a' is the amplitude, then its potential energy is maximum when the displacement is

(A) $+a/2$
(B) $+a$ or $-a$
(C) $-a/2$
(D) zero

79. Which of the following method is suitable for flaw detection?

(A) Photography
(B) Radio frequency
(C) Laser
(D) Ultrasonic

80. In signal flow graphs, node which has only outgoing branches is called

(A) input node
(B) output node
(C) mixed node
(D) general node

81. Inverse Laplace transform of $\frac{1}{(s+a)}$ is

(A) e^{-at}
(B) e^{+at}
(C) $1-e^{-at}$
(D) $1+e^{-at}$

82. The Dirac delta function δ(t) is defined as

(A) $\delta(t)=\begin{cases}1 & t=0\\ 0 & otherwise\end{cases}$

(B) $\delta(t)=\begin{cases}\infty & t=0\\ 0 & otherwise\end{cases}$

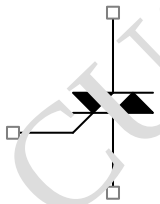
(C) $\delta(t)=\begin{cases}1 & t=0\\ 0 & otherwise\end{cases} \wedge \int_{-\infty}^{\infty}\delta(t)\,dt=1$

(D) $\delta(t)=\begin{cases}\infty & t=0\\ 0 & otherwise\end{cases} \wedge \int_{-\infty}^{\infty}\delta(t)\,dt=1$

83. The process by which the glucose is partially broken down in the absence of oxygen is called

(A) aerobic respiration
(B) anaerobic respiration
(C) oxygen release
(D) reduction

84. The following symbol refers to



(A) TRIAC
(B) SCR
(C) UJT
(D) Diode

85. Instrument which measures force and velocity of wind and its direction is

(A) Anemometer
(B) Barometer
(C) Barograph
(D) Bolometer

86. The device used to determine the density and coefficient of expansion of liquids is

(A) Polymeter
(B) Photometer
(C) Pykometer
(D) Periscope

87. The working of a refrigerator is based on the principle of

(A) Mechanics
(B) Thermodynamics
(C) Biomechanics
(D) Fluid dynamics

88. With the increase of pressure, the boiling point of the substance

(A) increases
(B) decreases
(C) remains the same
(D) becomes zero

89. Loudness of sound depends upon

(A) frequency of the sound
(B) wavelength of the sound
(C) amplitude of the sound
(D) pitch of the sound

90. Method to determine purity of a metal is based on

(A) Boyle's law
(B) Pascal's law
(C) Archimedes principle
(D) Newton's law

91. The image formed on the retina of the eye is

(A) real and inverted
(B) real and erect
(C) virtual and erect
(D) virtual and inverted

92. A small piece of non-magnetised_____ material gets repelled when it is brought near a powerful magnet.

(A) paramagnetic
(B) diamagnetic
(C) ferrimagnetic
(D) ferromagnetic

93. Longitudinal waves do not exhibit

(A) polarisation
(B) reflection
(C) refraction
(D) diffraction

94 The phenomenon of splitting white light into several colours is called

(A) refractive index
(B) dispersion
(C) scattering
(D) refraction

95. One nautical mile is equivalent to

(A) 1.44 x 1000 m
(B) 1.852 x 100 m
(C) 1.852 x 1000 m
(D) 1.44 x 100 m

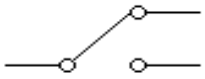
96. The dimensional formula of work done is

(A) $M^1 L^1 T^{-1}$
(B) $M^1 L^2 T^{-1}$
(C) $M^1 L^{-1} T^{-2}$
(D) $M^1 L^2 T^{-2}$

97. Which of the following is not a conservative force?

(A) Electrostatic force
(B) Magnetic force
(C) Force in an elastic spring
(D) Frictional force

98. What type of switch is this?



(A) Push button
(B) SPST
(C) DPDT
(D) SPDT

99. The ripple factor of full wave rectifier is

(A) 0.482
(B) 1.482
(C) 1.21
(D) 0.21

100. Zener diode is operated in

(A) forward region
(B) reverse region
(C) breakdown region
(D) cut-off region

101. The sequence of colour band for 47K resistor with 5% tolerance should be

(A) yellow,violet,yellow and silver
(B) yellow, yellow, orange and silver
(C) yellow,orange,orange and gold
(D) yellow,violet,orange and silver

102. Transistors used in digital circuits usually operate in the

(A) active region
(B) breakdown region
(C) saturation and cut-off region
(D) linear region

103. In a C-E configuration, an emitter resistor is used for

(A) stabilization
(B) AC signal bypass
(C) collector bias
(D) higher gain

104. The collector current for a C-E configuration with a beta of 100 and a base current of 30 μA is

(A) 30μA
(B) 3mA
(C) 0.3A
(D) 3 μA

105. When $V_{GS} = 0$ V, a JFET is

(A) saturated
(B) cut off
(C) open switch
(D) zero bias

106. Which among the following is not an advantage of RC coupled amplifiers?

(A) High fidelity
(B) No core distortion
(C) No impedance matching
(D) Wide frequency response

107. Identify the true statement

(A) CC amplifier has a large current gain
(B) CE amplifier has a large current gain
(C) CB amplifier has low voltage gain
(D) CC amplifier has low current gain

108. Hartley oscillator is commonly used in

(A) radio receivers
(B) radio transmitters
(C) TV receivers
(D) TV transmitters

109. A Wien bridge oscillator uses

(A) only positive feedback
(B) only negative feedback
(C) both positive and negative feedback
(D) zero feedback

110. The crystal oscillator frequency is very stable due to

(A) rigidity of the crystal
(B) vibrations of the crystal
(C) low Q of the crystal
(D) high Q of the crystal

111. In Colpitt's oscillator, feedback is obtained

(A) by magnetic induction
(B) by a tickler coil
(C) from the centre of split capacitors
(D) from the resistor

112. Input impedance of an emitter follower is

(A) zero
(B) low
(C) high
(D) very low

113. The point of intersection of DC and AC load lines is called

(A) saturation point
(B) cut off point
(C) operating point
(D) bypass point

114. The normal way to turn on a Diac is by

(A) gate current
(B) gate voltage
(C) break over voltage
(D) forward current

115. The technique used to determine the stability of **op**-amp is

(A) frequency response plot
(B) transient response plot
(C) bode plot
(D) polar plot

116. For a PLL IC 565 with timing resistor and timing capacitor of about 15 kΩ and 0.02μ F, the value of output frequency (f_0) is

(A) 433.33 Hz
(B) 833.33 Hz
(C) 1000 Hz
(D) 2500 Hz

117. The number of resistors needed for designing 3 bit weighted resistor DAC is

(A) one
(B) two
(C) three
(D) four

118. Choose the vector quantity

(A) Relative permeability
(B) Magnetic field intensity
(C) Flux density
(D) Magnetic potential

119. The ratio of intensity of magnetisation to the magnetisation force is

(A) relative permeability
(B) magnetic field intensity
(C) flux density
(D) susceptibility

120. A conductor of length L and current I is placed parallel to a magneticfield. The force experienced by the conductor is

(A) BIL
(B) 2BIL
(C) 3BIL
(D) 0

121. The Coulomb law is an implication of

(A) Ampere law
(B) Gauss law
(C) Biot Savart law
(D) Lenz law

122. Odd parity of word can be tested by

(A) OR gate
(B) AND gate
(C) NAND gate
(D) XOR gate

123. The code where all successive numbers differ from their preceding number by single bit is

(A) Binary code
(B) BCD code
(C) Excess 3 code
(D) Gray code

124. Fan-in and Fan-out are the characteristics of

(A) Registers
(B) Logic families
(C) Flip flop
(D) Combinational circuits

125. The four input MUX would have

(A) 1 select line
(B) 2 select lines
(C) 3 select lines
(D) 4 select lines

126. Register, the digital device is a type of

(A) combinational circuit
(B) latches
(C) CPU
(D) sequential circuit

127. The Instructions used by 8085 microprocessor for data transfer in I/O mapped I/O are

(A) IN, OUT
(B) STA add
(C) IN, LDA add
(D) LDAX

128. The non-maskable interrupt in 8085 microprocessor is

(A) RST 7.5
(B) RST 6.5
(C) TRAP
(D) INTR

129. The addressing mode used in instruction MOV M, C is

(A) direct
(B) indirect
(C) immediate
(D) implicit

130. Which of the following memories needs to be refreshed frequently?

(A) SRAM
(B) DRAM
(C) ROM
(D) EPROM

131. Following type of sensors are used to generate information in object grasping and obstacle avoidance.

(A) Hall effect sensor
(B) proximity sensor
(C) light sensor
(D) magnetic sensor

132. Which of the following is an analog transducer?

(A) Encoders
(B) Strain gauge
(C) Digital tachometers
(D) Limit switches

133. The linear variable differential transformer transducer is

(A) inductive transducer
(B) capacitive transducer
(C) non-inductive transducer
(D) resistive transducer

134. In concave mirror, size of the image depends upon

(A) size of object
(B) position of object
(C) area covered by object
(D) shape of object

135. The ratio of phase difference to the path difference between two light waves is

(A) $2\pi/\lambda$

(B) $2\pi\lambda$

(C) $\lambda/2\pi$

(D) $1/2\pi\lambda$

136. The diameter of dark rings in Newton's rings is

(A) inversely proportional to the square root of odd numbers
(B) directly proportional to the square root of natural numbers
(C) directly proportional to the square root of odd numbers
(D) inversely proportional to the square root of natural numbers

137. Plane polarised light can be produced by

(A) simple reflection
(B) Nicol's prism

(C) pile of plates
(D) All of the above

138. Modulus of rigidity of ideal liquid is

(A) unity
(B) finite
(C) infinite
(D) zero

139. The property by which a body returns to its original shape after removal of the force is called

(A) plasticity
(B) elasticity
(C) ductility
(D) malleability

140. Which of these is a non-hookean material?

(A) Steel
(B) Aluminium
(C) Rubber
(D) Copper

141. If $x = b + c$, $y = c + a$, $z = a + b$, then $x^2 + y^2 + z^2 - 2xy - 2xz + 2yz$ is equal to

(A) $a+b+c$
(B) $4b^2$
(C) abc
(D) a^2+b^2

142. The matrix $B=A^T$, where A is

(A) skew symmetric
(B) symmetric about the secondary diagonal
(C) always symmetric
(D) another general matrix

143. If A and B are non-zero square matrices, then AB = 0 implies

(A) A and B are orthogonal

(B) A and B are singular
(C) B is singular
(D) A is singular

144. The function $f(x) = x^3 - 6x^2 + 9x + 25$ has

(A) A maxima at x= 1 and a minima at x = 3
(B) A maxima at x = 3 and a minima at x = 1
(C) No maxima, but a minima at x = 1
(D) A maxima at x = 1, but no minima

145. The interval in which the Lagrange's theorem is applicable for the function f(x) = 1/x is

(A) [-3,3]
(B) [-2,2]
(C) [2,3]
(D) [-1,1]

146. The mathematical perception of gradient is

(A) slope
(B) arc
(C) chord
(D) tangent

147. The divergence of the vector xi+yj+zk is

(A) 0
(B) 1
(C) 3
(D) 2

148. The cell in which electrical energy is converted to chemical energy is

(A) galvanic cell
(B) voltaic cell
(C) electrolytic cell
(D) electrochemical cell

149. Sea water can be converted into fresh water by

(A) osmosis

(B) sedimentation
(C) diffusion
(D) reverse osmosis

150. Sky looks blue due to

(A) transmission
(B) dispersion
(C) reflection
(D) scattering

INSTRUMENTATION - ANSWER KEY

TEST CODE: 617

QN. NO.	KEY	QN. NO.	KEY	QN. NO.	KEY	QN. NO.	KEY	QN. NO.	KEY
1	B	26	A	51	B	76	A	101	D
2	C	27	D	52	B	77	A	102	C
3	B	28	C	53	D	78	B	103	A
4	B	29	C	54	C	79	D	104	B
5	C	30	C	55	D	80	A	105	A
6	C	31	C	56	C	81	A	106	C
7	B	32	A	57	B	82	D	107	B
8	D	33	D	58	A	83	B	108	A
9	C	34	A	59	C	84	A	109	C
10	D	35	A	60	C	85	A	110	D
11	A	36	B	61	D	86	C	111	C
12	C	37	D	62	A	87	B	112	C
13	D	38	B	63	D	88	A	113	C
14	B	39	B	64	B	89	C	114	C
15	D	40	D	65	D	90	C	115	C
16	D	41	D	66	C	91	A	116	B
17	C	42	B	67	C	92	B	117	C
18	A	43	C	68	D	93	A	118	B
19	C	44	C	69	C	94	B	119	D
20	B	45	C	70	B	95	C	120	D
21	A	46	D	71	C	96	D	121	B
22	D	47	C	72	C	97	D	122	D
23	D	48	B	73	A	98	D	123	D
24	A	49	A	74	B	99	A	124	B
25	A	50	B	75	D	100	C	125	B

QN. NO.	KEY
126	A
127	A
128	C
129	B
130	B
131	B
132	B
133	A
134	B
135	A
136	B
137	D
138	D
139	B
140	C
141	B
142	A
143	A
144	A
145	C
146	A
147	C
148	A
149	D
150	D