1. The wire diameter used in bonded wire strain gauge is approximately

(A) 25 mm

(B) 25 cm

(C) 25 μm

(D) 250 μm

(E) Answer not known

2. A two-phase permanent magnet stepper motor has stator poles P, Q, R and T. If P and R are energized first, the rotor position will be:

(A) 45° position

(B) Vertical

(C) Horizontal

(D) No movement

(E) Answer not known

3. The rotor in a stepper motor moves due to the development of:

(A) Magnetic force

(B) Frictional force

(C) Gravitational force

(D) Centrifugal force

(E) Answer not known

4. In Fleming's left hand rule, the thumb represents

(A) Current

(B) Magnetic field

(C) Force

(D) Voltage

(E) Answer not known

5. Choose the correct statements regarding the classification of DC generators:

1. In a separately excited generator, the field winding is energized by an independent external DC source.
2. In a self-excited DC shunt generator, the field winding is connected in series with the armature conductors.
3. Shunt generators require residual magnetism in the iron core to initiate voltage build up.

(A) 1 only

(B) 1 and 2 only

(C) 1 and 3 only

(D) 1, 2 and 3

(E) Answer not known

6. Consider the following characteristics of a parallel resonant circuit:

I. It draws minimum current from the source

II. Its dynamic resistance equals 'R'

III. The total impedance is at its maximum

(A) I and II only
(B) II and III only
(C) I and III only
(D) I, II and III
(E) Answer not known

7. Choose the right answer

1. Superposition Theorem	_	All the sources active at a time
2. Thevenin's Theorem	–	Equivalent voltage source without series resistance
3. Maximum power Transfer theorem	–	$R_S = R_L$

(A) 1 and 2 only
(B) 1 and 3 only
(C) 3 only
(D) 2 and 3 only
(E) Answer not known

8. Assertion [A] : Maximum power is transferred to the load when the load resistance equals the source resistance.

Reason [R] : Under this condition, the load receives the equal possible power from the source.

(A) Both [A] and [R] are true, and [R] is the correct explanation.

(B) Both [A] and [R] are true, but [R] is not the correct explanation.

(C) [A] is true, But [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

9. Match the following

	Column A		Column B
(a)	Voltage source (inactive)	1.	Linear circuits
(b)	Current source (inactive)	2.	Algebraic sum
(c)	Final current	3.	Short circuit
(d)	Circuit	4.	Open circuit

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	1	3	2	4
(C)	4	2	3	1
(D)	3	4	2	1

(E) Answer not known

10. Consider a single circuit node where five conductors meet. Currents I_1, I_3 and I_4 are flowing towards the node, while currents I_2 and I_5 are flowing away from the node. Review the following mathematical statements:

I. $I_1 + I_3 + I_4 = I_2 + I_5$

II. $I_1 - I_2 + I_3 + I_4 - I_5 = 0$

III. $I_1 + I_2 + I_3 = I_4 + I_5$

Which of the statements above are correct expressions of Kirchhoff's current law?

(A) I only
(B) III only
(C) I, II and III
(D) I and II only
(E) Answer not known

11. In an IEEE 802.3 MAC frame format what is the bit sequence of the Start Frame Delimiter (SFD)

(A) 10101010
(B) 11110000
(C) 10101011
(D) 00001111
(E) Answer not known

12. Identify the protocol that communicates using UDP.

(A) HTTP
(B) SNMP
(C) FTP
(D) Telnet
(E) Answer not known

13. Identify the incorrect match from the pairs given below:

(A) Client : Finite application that terminates when the task completes

(B) Server : Infinite application that runs indefinitely waiting for requests

(C) Client-server disadvantage: Lacks central backup for files

(D) Peer-to-Peer disadvantage: Poor security and no central backup

(E) Answer not known

14. Identify the correct statement about mesh topology

(A) Installation and reconfiguration are easy

(B) Occupy less space

(C) Every node has a dedicated links to every other node

(D) A single device or cable failure will affect the performance

(E) Answer not known

15. Match the following, by choosing the correct pairs

List I	List II
(a) Keyboard	1. Ring
(b) Telephone	2. Full duplex
(c) Walkie-talkie	3. Half duplex
(d) Token passing	4. Simplex

	(a)	(b)	(c)	(d)
(A)	1	2	3	4
(B)	4	2	3	1
(C)	4	3	2	1
(D)	2	3	1	4

(E) Answer not known

16. Identify the incorrectly matched pair

(A) North bridge – Graphics port
(B) South bridge – USB port
(C) RAM – Permanent storage
(D) CPU – Data processing
(E) Answer not known

17. Choose the incorrect pair

1. Burst refresh – Multiple refresh cycles
2. Keyboard Reset Control – Ctrl + Alt + Del
3. DMA Clock Source – Hard disk speed
4. Bus mode – Synchronous

(A) 1
(B) 2
(C) 3
(D) 4
(E) Answer not known

18. Assertion [A] : Flash BIOS is stored in EEPROM.

Reason [R] : EEPROM can be erased and reprogrammed

(A) Both [A] and [R] are true and [R] is correct explanation of [A]
(B) Both [A] and [R] are true and [R] is not the correct explanation of [A]
(C) [A] true [R] False
(D) [A] false [R] True
(E) Answer not known

19. Identify the bus mode in the advanced chipset features setting that provides better performance

(A) Synchronous
(B) Asynchronous
(C) Sleep mode
(D) Turbo mode
(E) Answer not known

20. Match the following

	Column-I		Column-II
(a)	Bluetooth	1.	Used in remote controller
(b)	Infrared	2.	Blu-ray player
(c)	Parallel port	3.	Connect 8 device simultaneously
(d)	HDMI	4.	Centronics printer port

	(a)	(b)	(c)	(d)
(A)	3	4	1	2
(B)	4	3	2	1
(C)	3	1	4	2
(D)	4	1	2	3

(E) Answer not known

21. Select the printer that is mainly used for the applications which requires high printing speed

(A) Line printer
(B) Inkjet printer
(C) Thermal printer
(D) Dot matrix printer
(E) Answer not known

22. In an AT style keyboard DIN connector, which pin is designated for the clock signal

(A) Pin 2
(B) Pin 4
(C) Pin 5
(D) Pin 1
(E) Answer not known

23. The system bus is also known as the _____.

(A) I/O Bus
(B) Data Bus
(C) Address Bus
(D) Local Bus
(E) Answer not known

24. Choose the incorrect match

(A) RAM – Temporary storage
(B) ROM – Firmware
(C) HDD – Permanent storage
(D) Cache – Slowest memory
(E) Answer not known

25. Identify the correct order of steps followed during the execution of a function in C

1. Execute function body
2. Call function
3. Pass arguments
4. Return value

(A) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
(B) $2 \rightarrow 3 \rightarrow 1 \rightarrow 4$
(C) $2 \rightarrow 4 \rightarrow 3 \rightarrow 1$
(D) $2 \rightarrow 1 \rightarrow 4 \rightarrow 3$
(E) Answer not known

26. Assertion [A] : Union members share the same memory location.

Reason [R] : Only one union member can contain a meaningful value at a time.

(A) [A] is true, [R] is false

(B) [A] is false, [R] is true

(C) Both [A] & [R] are true and [R] is the correct explanation

(D) Both [A] & [R] are true and [R] is not the correct explanation

(E) Answer not known

27. Identify the output of the following code:

```
# include <stdio.h>
int main( )
{
int a[ ] ={5,10,15};
printf("%d", a[1];
return 0;
}
```

(A) 10

(B) 5

(C) 15

(D) error

(E) Answer not known

28. Identify the data type that does not belong to the primary data types in C

(A) integer
(B) array
(C) character
(D) floating-point
(E) Answer not known

29. The % d format specifier in the Scanf( ) is used to read a

(A) Floating point value
(B) Decimal integer
(C) Single character
(D) String
(E) Answer not known

30. The operator >> in C language is known as

(A) Right shift operator
(B) Left shift operator
(C) Bitwise AND operator
(D) Bitwise OR operator
(E) Answer not known

31. The programming used for PLCs is

(A) C++
(B) Java
(C) Ladder diagram
(D) Python
(E) Answer not known

32. How do pulse width modulated inverters improve their performance?

(A) By increasing harmonics
(B) By reducing harmonics
(C) By reducing input voltage
(D) By eliminating switching
(E) Answer not known

33. The another name of class E commutation is

(A) Line commutation
(B) Load commutation
(C) External pulse commutation
(D) Complementary commutation
(E) Answer not known

34. Assertion [A] : Natural commutation is employed in AC circuits.

Reason [R] : The anode current becomes zero at every half cycle.

(A) Both [A] and [R] are true, but it is not the correct explanation

(B) Both [A] and [R] are true, and [R] is the correct explanation

(C) [A] is true, [R] is false

(D) [R] is true, [A] is false

(E) Answer not known

35. The power flow in a class B chopper is

(A) Source to load

(B) Load to source

(C) AC to DC

(D) AC to AC

(E) Answer not known

36. How does increasing firing angles affect output voltage?

(A) Output voltage decreases

(B) Output voltage increases

(C) Output voltage remains constant

(D) Output voltage is zero

(E) Answer not known

37. The maximum firing angle of half controlled bridge converter is

(A) 90° (B) 180°

(C) 360° (D) 120°

(E) Answer not known

38. Consider the following statements with regard to a GTO:- Identify the correct statement

1. The turn – off gain of the GTO is large
2. Large- negative gate current pulses are required to turn-off the GTO
3. GTO has large reverse blocking capability

(A) 1 only
(B) 2 only
(C) 3 only
(D) 1,2, and 3
(E) Answer not known

39. The fastest switching device among the following is

(A) BJT
(B) IGBT
(C) MOSFET
(D) SCR
(E) Answer not known

40. IGBT combines

(A) MOSFET and BJT
(B) SCR and MOSFET
(C) SCR and BJT
(D) MOSFET and FET
(E) Answer not known

41. Choose the correct statement

Raspberry pi camera commands

1. raspistill captures images
2. raspivid records videos
3. raspivid requires a camera interface
4. raspivid is used for audio recording

(A) 1 and 2
(B) 1, 2 and 3
(C) 2, 3, and 4
(D) Only 4
(E) Answer not known

42. Which statements are correct?

1. Arduino uses C++ based programming
2. Setup( ) executes repeatedly
3. Loop ( ) executes once
4. Arduino programs are called sketches

(A) 1 and 2 correct
(B) 1 and 4 correct
(C) 2 and 3 correct
(D) 2 and 4 correct
(E) Answer not known

43. A microprocessor places $A_1 = 1$ and $A_0 = 1$ while accessing the 8255, which register is selected?

(A) Control register

(B) Part A

(C) Part B

(D) Part C

(E) Answer not known

44. Assertion [A] : RS232 cannot be connected directly to the 8051 serial port

Reason [R] : RS232 uses ± 3V to ± 25V signaling, whereas the 8051 uses TTL logic levels (0V and + 5V)

(A) Both [A] and [R] are true and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, [R] is false

(D) [A] is false, [R] is true

(E) Answer not known

45. Select the correct statement:

1.	Mode 0	–	13 bit timer mode
2.	Mode 1	–	Split timer mode
3.	Mode 2	–	8-bit auto reload timer
4.	Mode 3	–	16-bit timer mode

(A) Only 1 and 3
(B) Only 2 and 4
(C) Only 1 and 2
(D) Only 3 and 4
(E) Answer not known

46. Assertion [A] : The instruction MOVX is used for external data memory access

Reason [R] : 8051 has separate external data memory space

(A) [A] true, [R] false
(B) [A] false, [R] true
(C) Both [A] and [R] are true, but [R] does not explain [A]
(D) Both [A] and [R] are true and [R] explains [A]
(E) Answer not known

47. The 8051 microcontroller has _____ of on chip ROM.

(A) 4 KB (B) 8 KB
(C) 16 KB (D) 32 KB
(E) Answer not known

48. Select the correct pairs:

1. $P_{3.0} - R \times D$
2. $P_{3.1} - T \times D$
3. $P_{3.2} - T_O$
4. $P_{3.3} - \overline{WR}$

(A) Only 1 is correct
(B) 2 and 3 are correct
(C) 1 and 2 are correct
(D) 3 and 4 are correct
(E) Answer not known

49. Find the timers clock frequency and its period for 8051 based systems with crystal frequency of 12 MHz

(A) $f = 0.5\,\text{MHz}\ T = 2\mu_s$
(B) $f = 1\ \text{MHz}\ T = 1\mu_s$
(C) $f = 2\,\text{MHz}\ T = 0.5\mu_s$
(D) $f = 1.33\,\text{MHz}\ T = 0.7\mu_s$
(E) Answer not known

50. Which of the following instructions come under data transfer?

Instruction

(i) MOV direct, R_n

(ii) Push direct

(iii) MOVX A,@ R_i

(iv) INC DPTR

(A) (iv) only
(B) (i) and (ii)
(C) (i),(ii) and (iii)
(D) (ii),(iii) and (iv)
(E) Answer not known

51. The ability of the eye to recognize colors is called

(A) Resolution
(B) Color perception
(C) Synchronization
(D) Luminance
(E) Answer not known

52. Identify the scanning method is commonly used in a monochrome TV

(A) Interlaced scanning
(B) Progressive scanning
(C) Spiral scanning
(D) Random scanning
(E) Answer not known

53. In a color TV receiver, the chrominance signal is separated by the

(A) RF amplifier
(B) Chroma decoder
(C) Speaker
(D) Power supply
(E) Answer not known

54. The television system that is compatible with monochrome receivers is

(A) Color TV broadcasting system
(B) CCTV
(C) LCD TV
(D) Plasma TV
(E) Answer not known

55. Arrange in chronological order

1. Electron beam generation
2. Picture formation
3. Phosphor screen illumination
4. Deflection

(A) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
(B) $2 \rightarrow 1 \rightarrow 4 \rightarrow 3$
(C) $1 \rightarrow 4 \rightarrow 3 \rightarrow 2$
(D) $2 \rightarrow 3 \rightarrow 4 \rightarrow 1$
(E) Answer not known

56. The main advantage of color TV over monochrome TV is

(A) Lower power consumption
(B) Better sound
(C) Natural color reproduction
(D) Smaller size
(E) Answer not known

57. The colour television system developed in Germany is

(A) NTSC
(B) SECAM
(C) HDTV
(D) PAL
(E) Answer not known

58. An aural transmitter is used to transmit

(A) Video signals
(B) Colour signals
(C) Audio (sound) signals
(D) Synchronizing signals
(E) Answer not known

59. In PAM transmission, noise mainly affects

(A) Position of the pulse
(B) Width of the pulse
(C) Amplitude of the pulse
(D) Frequency of the pulse
(E) Answer not known

60. Ribbon microphone operates on principle of

(A) Magnetic induction
(B) Piezoelectric effect
(C) Mechanical induction
(D) Change of capacitance
(E) Answer not known

61. Crystal microphone operates on the principle of

(A) Magnetic effect
(B) Piezoelectric effect
(C) Capacitance effect
(D) Inductive effect
(E) Answer not known

62. Dynamic microphone works on the principle

(A) Capacitance changes
(B) Piezoelectric effect
(C) EMF induced conductor cutting magnetic field
(D) Pressure changes
(E) Answer not known

63. The principle of loud speaker is to

(A) Convert the sound energy to electrical energy
(B) Convert the electrical energy to sound energy
(C) Electromagnetic induction
(D) Piezo electric effect
(E) Answer not known

64. Why is interlaced scanning used in television?

(A) Reduces flicker
(B) Easy transmission
(C) High broadcasting
(D) Power consumption
(E) Answer not known

65. The colour TV system used officially in India is

(A) NTSC
(B) SECAM
(C) PAL-B/G
(D) PAL-1
(E) Answer not known

66. The Maximum Usable Frequency (MUF) is given by

(A) MUF = critical frequency / $\cos\theta$
(B) MUF = critical frequency $\times \cos\ \theta$
(C) MUF = 2 / $\cos\ \theta$
(D) MUF = 2 $\times$ critical frequency
(E) Answer not known

67. If the modulating frequency doubles while frequency deviation remains constant, the modulation index will

(A) Double
(B) Become half
(C) Remain unchanged
(D) Become zero
(E) Answer not known

68. The antenna commonly used for VHF television reception is

(A) Yagi-Uda antenna
(B) Dipole antenna
(C) Loop antenna
(D) Horn antenna
(E) Answer not known

69. An half-wave dipole antenna has a length equal to

(A) One-fourth of the wavelength
(B) One-half of the wavelength
(C) One wavelength
(D) Twice the wavelength
(E) Answer not known

70. Identify the odd one out with respect to a high level AM transmitter

(A) Modulator
(B) Envelope detector
(C) Audio power amplifier
(D) RF power amplifier
(E) Answer not known

71. Arrange the signal flow in a super heterodyne receiver.

1. Detector
2. RF amplifier
3. IF amplifier
4. Mixer

(A) $3 \rightarrow 4 \rightarrow 2 \rightarrow 1$
(B) $2 \rightarrow 4 \rightarrow 3 \rightarrow 1$
(C) $4 \rightarrow 3 \rightarrow 2 \rightarrow 1$
(D) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
(E) Answer not known

72. The intermediate frequency in AM radio receiver is

(A) 100 KHZ
(B) 455 KHZ
(C) 455 MHZ
(D) 10 MHZ
(E) Answer not known

73. PCM stands for

(A) Phase Code Modulation
(B) Pulse Carrier Modulation
(C) Pulse Code Modulation
(D) Pulse Channel Modulation
(E) Answer not known

74. Arrange in chronological order:

Arrange the pulse modulation (PM) process in correct order:

1. Quantisation
2. Sampling
3. Encoding
4. Transmission

(A) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
(B) $2 \rightarrow 3 \rightarrow 1 \rightarrow 4$
(C) $1 \rightarrow 2 \rightarrow 4 \rightarrow 3$
(D) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$
(E) Answer not known

75. According to the Nyquist sampling theorem, the sampling frequency should be

(A) At least twice the highest frequency
(B) Equal to the highest frequency
(C) Half the highest frequency
(D) Four times the carrier frequency
(E) Answer not known

76. Choose the right match:

1. FM → Varies with amplitude
2. VHF → FM broadcasting
3. AM → Better noise immunity
4. Frequency discrimination → FM detector

(A) 1 and 3 only
(B) 2 and 4 only
(C) 2 and 3 only
(D) 1, 2, 3, 4
(E) Answer not known

77. Choose the right matches

1.	Bandwidth	– fm
2.	Modulation index	– V_m / V_c
3.	Sidebands	_ Carry information
4.	Carrier	– Constant frequency

(A) 2, 3 only
(B) 1,2 only
(C) 2,3,4 only
(D) All are correct
(E) Answer not known

78. A 100-watt (100-W) carrier is modulated to a depth of 80% (80 percent). Calculate the total power in the modulated wave

(A) 132 W
(B) 100 W
(C) 164 W
(D) 80 W
(E) Answer not known

79. Choose the right matches:

1. LAN – Office network
2. MAN – City network
3. WAN – Country Network

(A) 1 & 2 only
(B) 1, 2, & 3
(C) 3 only
(D) 2 & 3 only
(E) Answer not known

80. Choose the wrong matches

1. Ring – Circular connection
2. Mesh – Multiple communication paths
3. Bus – Highest Reliability
4. Star – Central connecting device

(A) 1 only
(B) 2 and 4 only
(C) 1,3 only
(D) 3 only
(E) Answer not known

81. An organization experiences frequent cable failures and needs uninterrupted communication between computers: The suitable topology for the above condition is

(A) Bus
(B) Ring
(C) Mesh
(D) Tree
(E) Answer not known

82. The modulation index is given by

(A) V_m / V_c
(B) V_c / V_m
(C) $V_m \times V_c$
(D) $V_m + V_c$
(E) Answer not known

83. The modulation index of Frequency Modulation (FM) is

(A) V_m / V_c

(B) Δf/fm

(C) f_c / f_m

(D) Bandwidth/ f_c

(E) Answer not known

84. Arrange propagation methods according to increasing frequency

1. Sky waves
2. Ground waves
3. Space Waves

(A) $1 \rightarrow 2 \rightarrow 3$ (B) $3 \rightarrow 2 \rightarrow 1$

(C) $1 \rightarrow 3 \rightarrow 2$ (D) $2 \rightarrow 1 \rightarrow 3$

(E) Answer not known

85. The standard Intermediate Frequency (IF) used in FM receivers is

(A) 455 KHZ

(B) 10.7 MHZ

(C) 455 MHZ

(D) 10.7 KHZ

(E) Answer not known

86. The purpose of the mixer in super heterodyne receiver is to

(A) Increase power
(B) Convert RF to IF
(C) Detect modulation
(D) Audio amplification
(E) Answer not known

87. The circuit that is essential in generating the carrier frequency in AM transmitter is

(A) Envelope detector
(B) Crystal oscillator
(C) Audio amplifier
(D) Discriminator
(E) Answer not known

88. In FM (Frequency Modulation) the amplitude of carrier is

(A) Variable
(B) Constant
(C) Increasing
(D) Decreasing
(E) Answer not known

89. The filter that allows signals within specific range to pass through and blocks outside that range is

(A) Band Pass Filter (BPF)

(B) Band Stop Filter (BSF)

(C) Low Pass Filter (LPF)

(D) High Pass Filter (HPF)

(E) Answer not known

90. In PCM, the number of quantizing level for a eight bit code is

(A) 256

(B) 16

(C) 64

(D) 10

(E) Answer not known

91. The frequency (f) of an astable multivibrator is

(A) $f = \frac{1}{1.38RC}$

(B) $f = \frac{1}{0.69RC}$

(C) $f = \frac{1}{RC}$

(D) $f = \frac{1}{2RC}$

(E) Answer not known

92. Assertion [A]: A half-wave voltage doubler uses two capacitors and two diodes.

Reason [R]: Capacitors charge during alternate half cycles and their voltages are added.

(A) [A] is false but [R] is true
(B) [A] is true but [R] is false
(C) Both [A] and [R] are true, but [R] does not explain [A]
(D) Both [A] and [R] are true, and [R] explains [A]
(E) Answer not known

93. A clipper circuit does not change the

(A) Shape of waveform
(B) Amplitude of waveform
(C) Frequency of waveform
(D) Voltage level
(E) Answer not known

94. TRIAC stands for

(A) Triggered alternating current
(B) Triode active current
(C) Three terminal active current
(D) Triode alternating current
(E) Answer not known

95. Assertion [A] : An SCR can conduct without a gate pulse

Reason [R] : If the forward voltage exceeds the breakdown voltage, the SCR turns ON.

(A) Both [A] and [R] are true, but [R] is not the correct explanation

(B) Both [A] and [R] are true, and [R] correctly explains [A]

(C) [A] is true, [R] is false

(D) [A] is false, [R] is true

(E) Answer not known

96. In RC phase shift oscillator, which of the following statements are correct?

1. Three RC sections together produces 180° phase shift
2. The transistor amplifier provides 180° phase shift
3. Each RC section provides 90° phase shift

(A) 1 only

(B) 2 only

(C) 1, 2 and 3

(D) 1 and 2 only

(E) Answer not known

97. For sustained oscillations, the total phase shift around the closed loop should be

(A) 90° (B) 180°

(C) 270° (D) 360°

(E) Answer not known

98. Identify the correct statements regarding negative feedback

1. Noise reduction
2. Reduction in Nonlinear distortion
3. Better-Stabilized voltage gain
4. Enhanced frequency response.

(A) 1 Only
(B) 1, 2, 3 and 4
(C) 1 and 2 only
(D) 3 and 4 only
(E) Answer not known

99. The emitter terminal of a UJT is made of

(A) N-type semiconductor
(B) Metal Contact only
(C) Intrinsic semiconductor
(D) P-type semiconductor
(E) Answer not known

100. The relationship among the JFET parameters

(A) $\mu = rd / gm$
(B) $gm = \mu \times rd$
(C) $rd = \mu \times gm$
(D) $\mu = gm \times rd$
(E) Answer not known

101. Match the following

Column A		Column B
(a)	CE amplifier	1. Leakage current
(b)	CC Amplifier	2. 180°phase shift
(c)	Operating Point	3. Emitter follower
(d)	Thermal runaway	4. Active region

	(a)	(b)	(c)	(d)
(A)	4	1	2	3
(B)	3	4	1	2
(C)	4	2	1	3
(D)	2	3	4	1

(E) Answer not known

102. Leakage current in a transistor extremely

(A) Decrease with temperature

(B) Remains constant

(C) Increases with temperature

(D) Becomes zero at high temperature

(E) Answer not known

103. Assertion [A] : Voltage Divider bias is the most commonly used for biasing method.

Reason [R] : It provides better thermal stability and a stable Q-point.

(A) Both [A] and [R] are true, and [R] explains [A]

(B) Both [A] and [R] are true, but [R] does not explain [A]

(C) [A] is true, [R] is false

(D) Both [A] and [R] are false

(E) Answer not known

104. The "pi" filter provides

(A) Poor filtering

(B) Excellent ripple reduction

(C) Signal amplification

(D) No voltage smoothing

(E) Answer not known

105. If both glass sheets are transparent, the LCD is called:

(A) Reflective type

(B) Emissive type

(C) Transmissive type

(D) Dynamic type

(E) Answer not known

106. Arrange the following steps in the correct sequence to explain the operation of an LDR:

1. Resistance of the semiconductor decreases
2. Conductivity of the semiconductor increases
3. Electron-hole pairs are produced
4. Light falls on the semiconductor material

(A) $3 \rightarrow 4 \rightarrow 1 \rightarrow 2$

(B) $4 \rightarrow 3 \rightarrow 1 \rightarrow 2$

(C) $1 \rightarrow 2 \rightarrow 4 \rightarrow 3$

(D) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$

(E) Answer not known

107. Consider the following statements:

I. Ripple is the A.C. component present in the rectified output.

II. Ripple factor is the ratio of the D.C. component to the A.C. component of voltage/current

III. Peak Inverse Voltage (PIV) is the maximum reverse voltage that can be applied across a diode without breaking the junction.

Which of the above statements are correct?

(A) I only correct

(B) II only correct

(C) I and III only correct

(D) I,II, and III correct

(E) Answer not known

108. Consider the following statements about a filter:

1. A filter removes unwanted AC components from rectified output.
2. A filter provides smooth DC voltage at the output.
3. A filter increases the frequency of the input signal

Which of the above statements are correct?

(A) 1 only
(B) 1 and 2 only
(C) 2 and 3 only
(D) 1,2 and 3
(E) Answer not known

109. Match the following:

List I	List II
(a) Zener diode	1. Voltage regulator
(b) Avalanche breakdown	2. Collision ionization
(c) Heavy doping	3. Narrow depletion region
(d) Zener voltage	4. Breakdown voltage

	(a)	(b)	(c)	(d)
(A)	2	1	4	3
(B)	1	2	3	4
(C)	3	4	2	1
(D)	4	3	1	2

(E) Answer not known

110. Assertion [A] : The depletion region becomes narrower during reverse bias.

Reason [R] : Reverse bias increases the width of the depletion region

(A) Both [A] and [R] are true, and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true, [R] is false

(D) [A] is false, [R] is true

(E) Answer not known

111. FPGA mainly consists of

(A) Logic blocks and programmable interconnections

(B) ALU only

(C) RAM only

(D) Registers only

(E) Answer not known

112. Arrange FPGA design flow

1. Synthesis
2. Coding (HDL)
3. Programming
4. Simulation

(A) $2 \rightarrow 3 \rightarrow 4 \rightarrow 1$

(B) $3 \rightarrow 2 \rightarrow 1 \rightarrow 4$

(C) $2 \rightarrow 4 \rightarrow 1 \rightarrow 3$

(D) $3 \rightarrow 1 \rightarrow 4 \rightarrow 2$

(E) Answer not known

113. CPLD stands for

(A) Complex Programmable Logic Device

(B) Central Programmable Logic Device

(C) Complex Processing Logic Device

(D) Computer Programmable Logic Device

(E) Answer not known

114. Assertion [A] : PAL is generally faster than PLA.

Reason [R] : PAL uses a fixed OR array, reducing the propagation delay

(A) Both [A] and [R] are true, and [R] explains [A]

(B) Both [A] and [R] are true, but [R] does not explain [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

115. Arrange the design steps for PLA implementation

1. Program PLA
2. Obtain truth table
3. Simplify Boolean expressions.

(A) $1 \rightarrow 2 \rightarrow 3$

(B) $3 \rightarrow 1 \rightarrow 2$

(C) $2 \rightarrow 3 \rightarrow 1$

(D) $2 \rightarrow 1 \rightarrow 3$

(E) Answer not known

116. Assertion [A] : A down counter decreases its value after every clock pulse.

Reason [R] : A down counter uses the operation count <= count+1.

(A) Both [A] and [R] are true

(B) Both [A] and [R] are false

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

117. Identify the VHDL statement that increments the counter

(A) Count <= count –1;

(B) Count <= not count;

(C) Count<= count × or 1;

(D) Count <= count +1;

(E) Answer not known

118. The VHDL statement best suited for implementing a decoder is

(A) Loop

(B) Case

(C) Wait

(D) Exit

(E) Answer not known

119. Arrange in chronological order design of 4-bit adder

1. Write entity
2. Compile
3. Write architecture
4. Simulate

(A) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$ (B) $1 \rightarrow 3 \rightarrow 2 \rightarrow 4$

(C) $1 \rightarrow 3 \rightarrow 4 \rightarrow 2$ (D) $1 \rightarrow 4 \rightarrow 3 \rightarrow 2$

(E) Answer not known

120. Assertion [A] : CMOS technology provides high noise immunity

Reason [R] : CMOS circuits consume very low static power

(A) Both [A] and [R] are true, and [R] is the correct explanation of [A]

(B) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(C) [A] is true but [R] is false

(D) [A] is false but [R] is true

(E) Answer not known

121. Flash memory is mainly used in

(A) Cache memory

(B) Pen drive and SSD

(C) Registers

(D) CPU

(E) Answer not known

122. The programming technology of memory replacing fuses

(A) EEPROM technology
(B) Flash memory technology
(C) Anti-Fuse technology
(D) EPROM technology
(E) Answer not known

123. Arrange the evolution of ROM technologies

a. PROM
b. Flash memory
c. EEPROM
d. EPROM

(A) $a \rightarrow c \rightarrow d \rightarrow b$
(B) $a \rightarrow b \rightarrow c \rightarrow d$
(C) $a \rightarrow d \rightarrow c \rightarrow b$
(D) $a \rightarrow c \rightarrow b \rightarrow d$
(E) Answer not known

124. Find the analog output of an 8 bit unipolar DAC with 5V reference for the digital input 11001010_2.

(A) 4.39 V
(B) 3.49 V
(C) 0.394 V
(D) 3.94 V
(E) Answer not known

125. Match the following

Column A	Column B
(a) SAR ADC	1. Two resistor values
(b) Ramp ADC	2. Constant conversion time
(c) Dual slope ADC	3. Variable conversion time
(d) R-2R DAC	4. Noise immunity

	(a)	(b)	(c)	(d)
(A)	2	3	4	1
(B)	1	2	3	4
(C)	3	1	2	4
(D)	2	1	4	3

(E) Answer not known

126. In a weighted resistor DAC resistor values are base on

(A) Equal valves
(B) Binary weighting
(C) Decimal weighting
(D) Random valves
(E) Answer not known

127. Assertion [A] : Dual slope ADC is widely used in Digital voltmeters.

Reason [R] : It provides excellent noise rejection.

(A) Both [A] and [R] are true, and [R] correctly explains [A]
(B) Both [A] and [R] true, but [R] is not the correct explanation
(C) [A] is true, [R] is false
(D) [A] is false, [R] is true
(E) Answer not known

128. A synchronous counter differs from and asynchronous counter because

(A) It uses fewer flip flops

(B) All flip flops receive the clock simultaneously

(C) It cannot count downward

(D) It has no propagation delay

(E) Answer not known

129. The race around condition occurs in

(A) SR flip flop

(B) D flip flop

(C) T flip flop

(D) JK flip flop

(E) Answer not known

130. Match the following

Column A	Column B
(a) D flip flop	1. Toggle
(b) T flip flop	2. Data storage
(c) JK flip flop	3. No invalid state
(d) SR flip flop	4. Invalid condition

	(a)	(b)	(c)	(d)
(A)	2	1	3	4
(B)	1	2	4	3
(C)	3	4	2	1
(D)	4	3	1	2

(E) Answer not known

131. A 4:1 multiplexer has $I_0 = 1, I_1 = 0, I_2 = 1, I_3 = 0$. If $S_1, S_0 = 11$, the output is

(A) 1
(B) high
(C) 0
(D) Invalid
(E) Answer not known

132. A 1 : 4 demultiplexer receives input 1 and select lines are 10

Arrange the sequence

1. Output y_2 becomes high.
2. Select inputs are applied
3. Input data is received
4. Demultiplexer routes input to y_2.

(A) $3 \rightarrow 2 \rightarrow 4 \rightarrow 1$
(B) $2 \rightarrow 3 \rightarrow 4 \rightarrow 1$
(C) $3 \rightarrow 4 \rightarrow 2 \rightarrow 1$
(D) $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$
(E) Answer not known

133. Match the following

	Column A	Column B
(a)	Encoder	1. Multiple outputs
(b)	Decoder	2. Binary code
(c)	Parallel adder	3. Error detection
(d)	Parity checker	4. Simultaneous addition

	(a)	(b)	(c)	(d)
(A)	4	3	2	1
(B)	2	1	4	3
(C)	1	3	2	4
(D)	3	1	4	2

(E) Answer not known

134. The Boolean function Y = AB+CD is to be realized using only 2-input NAND gates. The minimum number of gates required is

(A) 2

(B) 3

(C) 4

(D) 5

(E) Answer not known

135. An ideal OP-Amp has

(A) Infinite input and output impedance

(B) Very low input and output impedance

(C) Low input and infinite output impedance

(D) Infinite input and zero output impedance

(E) Answer not known

136. The logical expression $Y=A+A\overline{B}$ is equivalent to

(A) $Y=AB$

(B) $Y=\overline{A}B$

(C) $Y=\overline{A}+B$

(D) $Y=A+B$

(E) Answer not known

137. Assertion [A] : De Morgan's theorem simplifies Boolean expressions.

Reason [R] : If converts "AND" operations into "OR" operations with complemented variables and vice versa.

(A) Both [A] and [R] true, and [R] is the correct explanation of [A]

(B) Both [A] and [R] true, but [R] is not the correct explanation of [A]

(C) [A] is true, but [R] is false

(D) [A] is false, but [R] is true

(E) Answer not known

138. Identify the wrong match

(A) AND – Logical multiplication

(B) OR – Logical addition

(C) NOT – Inverter

(D) XOR – Universal gate

(E) Answer not known

139. Arrange the sequence of operation of an IC 555 timer in astable mode

1. Capacitor charges
2. Output becomes low
3. Capacitor discharges
4. Output becomes high

(A) 1, 2, 3, 4
(B) 4, 1, 2, 3
(C) 1, 4, 3, 2
(D) 2, 1, 4, 3
(E) Answer not known

140. Match the following type :

Column A	Column B
(a) Comparator	1. Buffer
(b) Voltage follower	2. Compare voltages
(c) Integrator	3. Capacitor feed back
(d) Adder	4. Sum of inputs

	(a)	(b)	(c)	(d)
(A)	2	1	3	4
(B)	1	2	4	3
(C)	3	4	2	1
(D)	4	3	1	2

(E) Answer not known

141. IPC mechanism

(A) Mail box
(B) Pipe
(C) Both (A) and (B)
(D) Timer
(E) Answer not known

142. Semaphore can have only the values 0 and 1 is

(A) Shared semaphore
(B) Counting semaphore
(C) Binary semaphore
(D) Priority semaphore
(E) Answer not known

143. Context switching is the process of

(A) Changing the operating system
(B) Increasing CPU speed
(C) Formatting memory
(D) Saving the state of one task and restoring the state to another task
(E) Answer not known

144. The register that contains the status code of the I2C interface in LPC2148 is

(A) I2 DAT
(B) I2 ADR
(C) I2 CONSET
(D) I2 STAT
(E) Answer not known

145. LPC2148 has _____ operating modes in I2C interface

(A) 01
(B) 02
(C) 03
(D) 04
(E) Answer not known

146. In LPC2148 microcontroller, the baud rate of UART0 communication is controlled by

(A) Timer register
(B) ADC register
(C) UART divisor registers
(D) GPIO register
(E) Answer not known

147. Choose the wrong matches

1. VIC – Interrupt controller
2. PCC – Clock control
3. ADC – Sensor interfacing
4. UART – Flash programming

(A) 1 only
(B) 2 only
(C) 3 only
(D) 4 only
(E) Answer not known

148. How many ADC are available in LPC2148?

(A) 08
(B) 04
(C) 02
(D) 01
(E) Answer not known

149. In LPC2148, Timer, match control register (MCR) is used to control if an interrupt generated and if the TC is reset when _____ occurs.

(A) Timer
(B) Match
(C) Interrupt
(D) Reset
(E) Answer not known

150. In LPC2148 how many GPIO registers are available (32 bits)

(A) 01

(B) 02

(C) 03

(D) 04

(E) Answer not known

151. In LPC 2148 microcontroller PLL inputs, the value of FOSC is in the range of

(A) 1 MHz to 5 MHz

(B) 5 MHz to 15 MHz

(C) 10 MHz to 25 MHz

(D) 15 MHz to 25 MHz

(E) Answer not known

152. In LPC 2148 VPB bus clock is _____ of the processor clock.

(A) $1/4^{th}$

(B) $1/2^{th}$

(C) $3/4^{th}$

(D) 1

(E) Answer not known

153. The package of LPC 2148 is

(A) DIP
(B) TO-220
(C) BGA
(D) LQFP
(E) Answer not known

154. IRQ belongs to

(A) Clock generation
(B) Normal interrupt handling
(C) Analog conversion
(D) Serial communication
(E) Answer not known

155. Match the following

(a)	Pinsel 0	1.	P0.16-P0.31 function selection
(b)	Pinsel 1	2.	General purpose input/output
(c)	Pinsel 2	3.	P0.0-P0.15 function selection
(d)	GP10	4.	P1.16 to P1.31 function selection

	(a)	(b)	(c)	(d)
(A)	2	4	1	3
(B)	3	1	4	2
(C)	3	4	2	1
(D)	2	4	3	1

(E) Answer not known

156. UART is a

(A) Power unit
(B) Arithmetic unit
(C) Communication peripheral
(D) Memory device
(E) Answer not known

157. The instruction that updates the processor status flags after execution without affecting other registers is

(A) ADD
(B) MOV
(C) CMP
(D) LOAD
(E) Answer not known

158. Match the following

(a)	Abort mode	1.	Immediate interrupt request
(b)	FIR mode	2.	Processor is in after reset
(c)	IR mode	3.	Failed attempt to access memory
(d)	Supervisor mode	4.	Interrupt request

	(a)	(b)	(c)	(d)
(A)	3	1	4	2
(B)	1	2	4	3
(C)	4	3	2	1
(D)	4	3	1	2

(E) Answer not known

159. Choose the right matches among type:

(a)	R_{13}	1.	Status flags
(b)	R_{14}	2.	Instruction address
(c)	R_{15}	3.	Stack pointer
(d)	CPSR	4.	Return address

	(a)	(b)	(c)	(d)
(A)	3	4	2	1
(B)	1	2	3	4
(C)	4	3	2	1
(D)	3	2	1	4

(E) Answer not known

160. Find the wrong match

1.	RISC	–	Load/ store architecture
2.	CISC	–	Variable length instructions
3.	RISC	–	Many complex addressing modes
4.	ARM	–	RISC architecture

(A) 1 and 2 only
(B) 1 and 3 only
(C) 3 only
(D) 2 and 4 only
(E) Answer not known

161. FDMA stands for

(A) Frequency Division Multiple Amplifier
(B) Frequency Division Multiple Access
(C) File Division Multiplexer Access
(D) File Division Multiple Amplifier
(E) Answer not known

162. The main principle used in CDMA is

(A) Time division
(B) Frequency division
(C) Code division
(D) Space division
(E) Answer not known

163. Assertion [A]: CDMA uses unique spreading codes for different users.
Reason [R]: CDMA separates users by assigning different frequency bands

(A) Both [A] and [R] are true and [R] correctly explains [A]
(B) Both [A] and [R] are true, but [R] is not the correct explanation [A]
(C) [A] is true, [R] is false
(D) [A] is false, [R] is true
(E) Answer not known

164. A device that distributes an optical signal is called:

(A) Optical splitter
(B) Optical amplifier
(C) Optical connector
(D) Optical Attenuator
(E) Answer not known

165. For which of the following is not a recognized orbital path in space mechanics?

(A) Polar
(B) Triangular
(C) Circular
(D) Elliptical
(E) Answer not known

166. Which type of handover allows simultaneous communication with multiple base stations?

(A) Hard handover
(B) Soft handover
(C) Horizontal handover
(D) Vertical handover
(E) Answer not known

167. VLR store subscriber data:

(A) Temporarily
(B) Permanently
(C) For billing purpose only
(D) For SMS only
(E) Answer not known

168. Microwave antennas are usually:

(A) Omni-directional
(B) Highly directional
(C) Randomly radiating
(D) Scattering signal
(E) Answer not known

169. The gain of an antenna is measured in

(A) Volts
(B) Watts
(C) dB
(D) Hertz
(E) Answer not known

170. SMS stands for:

(A) Simple Messaging Service
(B) Short Message Service
(C) Signal Message Service
(D) System Messaging Service
(E) Answer not known

171. The following Diode used as electronic switch in the microwave frequency range

(A) Zener Diode
(B) Tunnel Diode
(C) Laser Diode
(D) PIN Diode
(E) Answer not known

172. A Gunn diode operates based on

(A) Tunnel effect
(B) Avalanche effect
(C) Transfer electron effect
(D) Thermal effect
(E) Answer not known

173. The common microwave link antenna is

(A) Dipole
(B) Log-Periodic
(C) Parabolic dish
(D) Rhombic
(E) Answer not known

174. How do supplementary ISDN services help GSM users?

(A) By increasing antenna height

(B) By changing the modulation technique

(C) By increasing transmitter power

(D) By providing extra feature such as call forwarding, caller ID and SMS

(E) Answer not known

175. Why is a transponder called the "heart" of a communication satellite?

(A) It receiver, amplifier; changes the frequency and retransmits signals

(B) It controls the satellite's orbit

(C) It generates electrical power

(D) It Controls satellite's temperature

(E) Answer not known

176. In a two-cavity Klystron the first cavity is

(A) Output cavity

(B) Buncher cavity

(C) Reflector cavity

(D) Resonator

(E) Answer not known

177. The satellite receives signals from the earth station through the _____ station.

(A) Up link
(B) Down link
(C) Transponder
(D) Control link
(E) Answer not known

178. The altitude range of a Low Earth Orbit (LEO) is typically _____.

(A) 100 – 500 km
(B) 160 – 2,000 km
(C) 5,000 – 10,000 km
(D) Exactly 35,786 km
(E) Answer not known

179. Kepler's first law states that the orbit of satellite around the earth is

(A) Circular
(B) Parabolic
(C) Straight line
(D) Elliptical
(E) Answer not known

180. Mobile satellite systems (MSS) provide the foundation for which new generation of wireless telephone service?

(A) Global positioning systems (GPS)

(B) Personal communications satellite systems (PCSS)

(C) Broad band wireless Access (BWA)

(D) Satellite Digital Audio Radio Services (SDARS)

(E) Answer not known

181. Assertion [A] : Laser diodes are widely used in fiber optic communication.

Reason [R] : Laser light is coherent and highly directional

(A) Both [A] and [R] are true and [R] explains [A]

(B) Both [A] and [R] are false

(C) Both [A] and [R] are true but [R] does not explain [A]

(D) [A] is true, [R] is false

(E) Answer not known

182. The mono mode (single mode) optical fiber has a very small core diameter of the order of _____.

(A) 50 to 110 μm

(B) 200 to 500 μm

(C) 12 to 24 μm

(D) 8 to 10 μm

(E) Answer not known

183. Assertion [A] : ISDN can transmit voice, video and data.

Reason [R] : ISDN is an integrated digital communication network

(A) [A] is true, [R] is false

(B) [A] is false, [R] is true

(C) Both [A] and [R] are true, and [R] explains [A]

(D) Both [A] and [R] are true, but [R] does not explains [A]

(E) Answer not known

184. Assertion [A] : Convolutional codes use memory elements

Reason [R] : The output depends on current and previous input bits

(A) Both [A] and [R] are false

(B) [A] is true and [R] is false

(C) Both [A] and [R] are true and [R] is the correct explanation for [A]

(D) Both [A] and [R] are true but [R] is not the correct explanation for [A]

(E) Answer not known

185. In digital codes CRC stands for

(A) Cyclic repetition check

(B) Channel redundancy check

(C) Cyclic redundancy check

(D) Cyclic recovery code

(E) Answer not known

186. ISDN stands for

(A) Integrated System Digital Network

(B) Integrated Services Digital Network

(C) Internet Services Digital Network

(D) International Services Digital Network

(E) Answer not known

187. In a telephone system, the standard voice frequency band recommended by the international telecommunication union telecommunication standardization sector (ITU-T/CCITT).

(A) 20 Hz to 20,000 Hz

(B) 300 Hz to 3,400 Hz

(C) 0 Hz to 4,000 Hz

(D) 50 Hz to 5,000 Hz

(E) Answer not known

188. For an FSK signal with a mark frequency of 59 KHz and space frequency of 61 KHz with an input data rate of 5 kbps. Find the baud rate of FSK modulation system.

(A) 5k baud

(B) 2k baud

(C) 10k baud

(D) 4k baud

(E) Answer not known

189. In a binary PSK modulation system, how many bits of data are transmitted per symbol?

(A) 1 bit
(B) 2 bits
(C) 3 bits
(D) 4 bits
(E) Answer not known

190. Amplitude shift keying is also called _____.

(A) PSK
(B) QPSK
(C) BFSK
(D) OOK
(E) Answer not known

191. Arrange the steps in sequence in digital data modulations.

1. Digital data is generated
2. Modulated signal is transmitted
3. Modulated combines data and carrier
4. Carrier signal is produced

(A) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4$
(B) $1 \rightarrow 4 \rightarrow 3 \rightarrow 2$
(C) $2 \rightarrow 1 \rightarrow 3 \rightarrow 4$
(D) $2 \rightarrow 3 \rightarrow 1 \rightarrow 4$
(E) Answer not known

192. Assertion [A] : Optical fiber is preferred for long-distance communication.

Reason [R]: It offers high bandwidth and longer repeater separation (Low attenuation)

(A) Both [A] and [R] are true, but [R] is not the correct explanation of [A]

(B) [A] is true, [R] is false

(C) [A] is false, [R] is true

(D) Both [A] and [R] are true and [R] is the correct explanation of [A]

(E) Answer not known

193. The unit of data transmission speed is

(A) Hertz

(B) Watts

(C) Bits per second

(D) Volts

(E) Answer not known

194. The process of converting an analog signal into a digital signal is:

(A) Modulation and demodulation

(B) Amplification and clipping

(C) Filtering and clamping

(D) Sampling quantizing and encoding

(E) Answer not known

195. The basic elements of a digital communication system include:

(A) Transmitter, channel, receiver
(B) Antenna only
(C) Amplifier only
(D) Oscillator only
(E) Answer not known

196. The main components of ILS are

(A) Localizer, glide slope and maker becomes
(B) Radar and receiver, transmitter
(C) Transmitter and modulator
(D) Antenna and demodulator
(E) Answer not known

197. PPI stands for

(A) Pulse Position Indicator
(B) Power Pulse Indicator
(C) Phase Position Indicator
(D) Plan Position Indicator
(E) Answer not known

198. The velocity of electromagnetic waves in free space is approximately

(A) $3\times10^{6} m/s$

(B) $3\times10^{8} m/s$

(C) $3\times10^{4} m/s$

(D) $3\times10^{2} m/s$

(E) Answer not known

199. In a pulse radar system, the transmitter sends:

(A) Continuous waves

(B) Short duration high power pulses

(C) Audio signals

(D) Modulated DC signals

(E) Answer not known

200. Assertion [A] : Radar can detect objects at long distances.

Reason [R] : Radar uses electromagnetic waves that travel at the speed of light.

(A) Both [A] and [R] are true and [R] explains [A]

(B) Both [A] and [R] are true but [R] does not explain [A]

(C) [A] is true, [R] is false

(D) Both [A] and [R] are false

(E) Answer not known