

PROVISIONAL ANSWER KEY

NAME OF THE POST

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Note: Candidate must ensure the compliance to send all suggestion in the given format with reference to this paper with provisional answer key only.

101. The Boolean function $A + BC$ is a reduced form of
 (A) $AB + BC$ (B) $(A + B)(A + C)$
 (C) $AB + AB'C$ (D) $(A + C)B$
102. In an 8085 microprocessor, after execution of XRA A instruction,
 (A) The carry flag is set
 (B) The accumulator contains FF_H
 (C) The content of accumulator is shifted by one
 (D) The zero flag is set
103. The first machine cycle of an instruction is always
 (A) A memory read cycle (B) An instruction fetch cycle
 (C) An I/O read cycle (D) A memory write cycle
104. In 8085 microprocessor, the value of the most significant bit of the result following the execution of any arithmetic or logic instruction is stored in
 (A) The carry status flag
 (B) The auxiliary carry status flag
 (C) The sign status flag
 (D) The zero status flag
105. The register which keeps track of the sequence of instruction execution is
 (A) Memory address register (B) Memory buffer register
 (C) Stack pointer (D) Program counter
106. In a microcomputer, wait states are used to
 (A) Make the processor wait during DMA operation
 (B) Make the processor wait during an interrupt processing
 (C) Make the processor wait during power shut down
 (D) Interface slow peripherals to the processor
107. A voltage source has source impedance of $3 + j4$ ohm. To transfer maximum power to the load, the load impedance should be
 (A) $3 + j4$ ohm (B) $3 - j4$ ohm
 (C) 3 ohm (D) $j4$ ohm

108. Which one of the following flags is not used for branching in a microprocessor ?
(A) Carry flag (B) Auxiliary carry flag
(C) Overflow flag (D) Parity flag
109. Which one of the following registers of 8085 microprocessor is NOT a part of programming model ?
(A) Instruction register (B) Memory address register
(C) Status register (D) Temporary data register
110. A network contains linear resistors and ideal voltage sources. If values of all the resistors are doubled, then the voltage across each resistor is
(A) halved (B) doubled
(C) increased four times (D) not changed
111. In a crystal of silicon, the number of covalent bonds that any silicon atom forms with its neighboring atoms is
(A) 4 (B) 3
(C) 2 (D) 1
112. As compared to a full wave rectifier, the bridge rectifier has the dominant advantage of
(A) higher current carrying capacity
(B) lower peak inverse voltage requirement
(C) lower ripple factor
(D) higher efficiency
113. The minimum number of 2-input NAND gates required to implement the Boolean function $Z = AB'C$, assuming that A, B and C are available, is
(A) 2 (B) 3
(C) 5 (D) 6
114. In a transistor circuit, there is an active region of operation when
(A) Both the junctions are forward biased
(B) Both the junctions are reverse biased
(C) emitter junction is forward biased and collector junction is reverse biased
(D) Both junctions are short circuited
115. LED is a
(A) p-n diode (B) thermistor
(C) gate (D) transistor

116. What is the typical value of the ratio of current in a p-n junction diode in the forward bias and that in the reverse bias ?
- (A) 1 (B) 10
(C) 0.10 (D) 1000
117. Which of the following is NOT associated with a p-n junction ?
- (A) Junction capacitance (B) Charge storage capacitance
(C) Depletion capacitance (D) Channel length modulation
118. In a p-n-p transistor biased in the active region, in the n-type base, holes
- (A) drift
(B) diffuse and recombine
(C) experience avalanche multiplication
(D) are injected from collector
119. Cascading amplifier stages to obtain a high gain is best done with
- (A) Common Emitter stages
(B) Common Base stages
(C) Common collector stages
(D) Combination of common base and common emitter stages
120. In a 2-bit half adder, the sum and carry bits are obtained, respectively, by the
- (A) NAND and OR gates (B) AND and NOR gates
(C) NOR and EX-OR gates (D) EX-OR and AND gates
121. The output of a logic gate is 1 when all its input are at logic 0. Then the gate is either
- (A) A NAND or an EX-OR (B) A NOR or an EX-NOR
(C) An OR or an EX-NOR (D) An AND or an EX-OR
122. The minimum number of NAND gates required to implement the Boolean function $A + AB' + AB'C$ is equal to
- (A) 0 (B) 1
(C) 4 (D) 7
123. Shottky clamping is resorted to in TTL gates
- (A) To reduce propagation delay (B) To increase noise margin
(C) To increase packing density (D) To increase fan out

124. In a common emitter amplifier, the unbypassed emitter resistance provides
(A) voltage shunt feedback (B) current series feedback
(C) current shunt feedback (D) voltage series feedback
125. A pulse train can be delayed by a finite number of clock periods using
(A) A serial-in serial-out shift register
(B) A serial-in parallel-out shift register
(C) A parallel-in serial-out shift register
(D) A parallel-in parallel-out shift register
126. The logical expression $Y = A + A'B$ is equivalent to
(A) $Y = AB$ (B) $Y = AB'$
(C) $Y = A' + B$ (D) $Y = A + B$
127. A 12 bit ADC is operating with a 1 microsecond clock period and the total conversion time is seen to be 14 microseconds. The ADC must be of the
(A) Flash type (B) Counting type
(C) Integrating type (D) Successive approximation type
128. A 2-bit binary multiplier can be implemented using
(A) 2 input AND only
(B) 2 input XORs and 4 input AND gates only
(C) Two 2 input NORs and one XNOR gate
(D) XOR gates and shift registers
129. In standard TTL, the 'totem pole' stage refers to
(A) The multi-emitter input stage (B) The phase splitter
(C) The output buffer (D) Open collector output stage
130. The switching speed of ECL (Emitter Coupled Logic) is very high, because the transistors
(A) are switched between cut-off and saturation regions
(B) are switched between active and saturation regions
(C) are switched between active and cut-off regions
(D) may operate into any of the three regions

131. The Laplace transform of $f(t) = tu(t)$ is given by
 (A) $1/s^2$ (B) $1/s$
 (C) $2/s^3$ (D) s
132. The sequence of instructions to complete the program would be
 (A) JNZ LOOP, ADD B, DCR C (B) ADD B, JNZ LOOP, DCR C
 (C) DCR C, JNZ LOOP, ADD B (D) ADD B, DCR C, JNZ LOOP
133. A low-pass filter with a cut-off frequency of 300 Hz is cascaded with a high-pass filter with a cut-off frequency of 200 Hz. The resultant system of filters will function as
 (A) an all-pass filter (B) a band-stop filter
 (C) a low pass filter (D) a band-pass filter
134. Two port networks are connected in cascade. The parameters of the network are obtained by multiplying the individual
 (A) z-parameter matrix (B) h-parameter matrix
 (C) y-parameter matrix (D) ABCD parameter matrix
135. For a two port network to be reciprocal, which condition should be satisfied ?
 (A) $Z_{11} = Z_{22}$ (B) $Y_{21} = Y_{12}$
 (C) $h_{21} = h_{12}$ (D) $AD - BC = 0$
136. The number of independent loops for a network with n nodes and b branches is
 (A) $n - 1$ (B) $b - n$
 (C) $b - n + 1$ (D) Independent of the number of nodes
137. If each branch of a delta circuit has impedance $\sqrt{3}Z$, then each branch of the equivalent Wye circuit has impedance
 (A) $Z / \sqrt{3}$ (B) $3Z$
 (C) $3\sqrt{3}Z$ (D) $Z / 3$
138. The Laplace transform of $i(t)$ is given by $I(s) = 2/[s(s + 1)]$. As $t \rightarrow \infty$, the value of $i(t) \rightarrow$
 (A) 0 (B) 1
 (C) 2 (D) ∞
139. A DC voltage source is connected across a series R-L-C circuit. Under steady state conditions, the applied DC voltage drops entirely across the
 (A) R only (B) L only
 (C) C only (D) R and L combination

140. A DC voltage source is connected to a series R-C circuit. In the steady-state, the ratio of energy stored in the capacitor to the total energy supplied by the voltage source is
- (A) 0.362 (B) 0.50
(C) 0.632 (D) 1.00
141. As a result of reflections from a plane conducting wall, electromagnetic waves acquire an apparent velocity greater than the velocity of light in space. This is called
- (A) velocity of propagation (B) normal velocity
(C) group velocity (D) phase velocity
142. A 4 GHz carrier is DSB-SC modulated by a low pass message signal with maximum frequency of 2 MHz. The resultant signal can be ideally sampled by sampling impulse train with frequency of
- (A) 4 MHz (B) 8 MHz
(C) 8 GHz (D) 8.004 GHz
143. The maximum power- efficiency of an AM modulation is
- (A) 25 % (B) 50 %
(C) 75 % (D) 100 %
144. Coherent demodulation of FSK signal can be effected using
- (A) Correlation receiver
(B) Bandpass filters and envelope detectors
(C) Matched filter
(D) Discrimination detection
145. Increased pulse width in flat-top sampling leads to
- (A) Attenuation of high frequency in reproduction
(B) Attenuation of low frequency in reproduction
(C) Greater aliasing errors in reproduction
(D) No harmful errors in reproduction
146. Phase velocity v_p and group velocity v_g in a waveguide are related by the equation
- (A) $v_p v_g = c^2$ (B) $v_p v_g = c$
(C) $v_p = v_c$ (D) $v_p + v_c = \text{constant}$

147. The image (second) channel selectivity of a super-heterodyne communication receiver is determined by
- (A) Antenna and pre-selector **(B) The pre-selector and RF amplifier**
(C) The pre-selector and IF amplifier (D) The RF and IF amplifier
148. A PLL can be used to demodulate
- (A) PAM signal (B) PCM signal
(C) FM signal (D) DSB-SC signal
149. An antenna, when radiating, has a highly directional radiation pattern. When the same antenna is receiving, its radiation pattern
- (A) is more directive (B) is less directive
(C) is the same (D) is omni-directional
150. Waveguides are used at
- (A) Microwave frequencies** (B) Audio frequencies
(C) Video frequencies (D) Mid-frequencies
151. A 1 kHz signal is flat-top sampled at the rate of 1800 samples per second and samples are applied to an ideal low pass filter with cut-off frequency of 1100 Hz. The output of the filter contains
- (A) Only 800 Hz component **(B) 800 Hz and 900 Hz components**
(C) 800 Hz and 1000 Hz components (D) 800 Hz, 900 Hz and 1000 Hz components
152. The line code that has zero DC component for the pulse transmission of random binary data is
- (A) Non return to zero(NRZ) (B) Return to zero (RZ)
(C) Alternate Mark Inversion(AMI) (D) None of the above
153. The signal to quantization noise ratio in a PCM system depends upon
- (A) sampling rate **(B) number of quantization levels**
(C) message signal bandwidth (D) Thermal noise
154. Bandwidth of an amplitude modulated signal depends upon
- (A) amplitude of modulating signal (B) carrier frequency
(C) modulating signal frequency (D) carrier power

155. The most commonly used amplifier in sample and hold circuit is
(A) A unity gain inverting amplifier
(B) A unity gain non-inverting amplifier
(C) An inverting amplifier with a gain of 10
(D) An inverting amplifier with a gain of 100
156. FM radio broadcasting takes place in the frequency band of
(A) 88-108 MHz (B) 95-97 MHz
(C) 10-20 MHz (D) 100-200 MHz
157. The input to a coherent detector is DSB-SC signal plus noise. The noise at the detector output is
(A) The in-phase component (B) The quadrature component
(C) Zero (D) The envelope
158. In an FM demodulator,
(A) capacitors are charged to amplitude of FM wave
(B) frequency deviations are converted into voltage variations
(C) simple diode is employed
(D) carrier frequency is doubled
159. At a given probability of error, binary coherent FSK is inferior to binary coherent PSK by
(A) 6 dB **(B) 3 dB**
(C) 2 dB (D) 0 dB
160. In a PCM system, if the code word length is increased from 6 to 8 bits, the signal to quantization noise ratio improves by
(A) 6 dB **(B) 12 dB**
(C) 16 dB (D) 8 dB
161. Which one of the following is a microwave frequency ?
(A) 1.7 MHz (B) 750 MHz
(C) 100 kHz **(D) 22 GHz**
162. The most common cross section of a waveguide is a
(A) square (B) circle
(C) triangle **(D) rectangle**

163. Which diode is a popular microwave oscillator ?
(A) Zener (B) Gunn
(C) Varactor (D) LED
164. A reflex klystron is used as a/an
(A) amplifier (B) oscillator
(C) mixer (D) frequency multiplier
165. An AM signal is detected using an envelope detector. The carrier frequency and modulating signal frequency are 12 MHz and 2 kHz respectively. An appropriate value for the time constant of the envelope detector is
(A) 500 μ sec (B) 20 μ sec
(C) 0.2 μ sec (D) 1 μ sec
166. An AM signal and a narrow band FM signal with identical carriers, modulating signals and modulation indices of 0.1 are added together. The resultant signal can be closely approximated by
(A) Broadband (B) SSB with carrier
(C) DSB-SC (D) SSB without carrier
167. Frequency modulated signal ideally requires
(A) infinite bandwidth (B) small bandwidth
(C) constant bandwidth (D) constant frequency
168. Three analog signals, having bandwidth of 1200 Hz, 600 Hz and 600 Hz are sampled at their respective Nyquist rates, encoded with 12 bit words and time division multiplexed. The bit rate for the multiplexed signal is
(A) 115.2 kbps (B) 28.8 kbps
(C) 57.6 kbps (D) 38.4 kbps
169. An AM broadcast radio transmitter radiates 10 kW power when the modulation percentage is 60. The power of the carrier is
(A) 5 kW (B) 7.69 kW
(C) 8.47 kW (D) 9.17 kW
170. Ideal digital filter is always a/an
(A) IIR filter (B) FIR filter
(C) Causal filter (D) Linear phase filter

171. If $s^3 + 3s^2 + 4s + A = 0$, then all roots of this equation are in the left half plane provided that
- (A) $A > 12$ (B) $-3 < A < 4$
 (C) $0 < A < 12$ (D) $5 < A < 12$
172. Signal flow graph is used to find
- (A) Stability of the system (B) Controllability of the system
 (C) Transfer function of the system (D) Poles of the system
173. The step error coefficient of a system $G(s) = 1 / [(s + 6)(s + 1)]$ with unity feedback is
- (A) $1 / 6$ (B) ∞
 (C) 0 (D) 1
174. For a second order system, damping ratio ζ is such that $0 < \zeta < 1$, then the roots of the characteristic polynomial are
- (A) Real but not equal (B) Real and equal
 (C) Complex conjugates (D) imaginary
175. Non- minimum phase transfer function is defined as the transfer function
- (A) Which has zeros in the right half s-plane
 (B) Which has zeros only in the left half s-plane
 (C) Which has poles in the right half s-plane
 (D) Which has poles in the left half s-plane
176. The transfer function of a tachometer is of the form
- (A) Ks (B) K/s
 (C) $K / (s + 1)$ (D) $K / [s(s + 1)]$
177. The transfer function of a zero-order hold system is
- (A) $(1 / s) (1 + e^{-sT})$ (B) $(1 / s) (1 - e^{-sT})$
 (C) $1 - (1 / s)e^{-sT}$ (D) $1 + (1 / s)e^{-sT}$
178. In a synchro error detection, the output voltage is proportional to $[w(t)]^n$, where $w(t)$ is the rotor velocity and n equals to
- (A) -2 (B) -1
 (C) 1 (D) 2

179. For a second-order system with the closed-loop transfer function $T(s) = 9 / (s^2 + 4s + 9)$, the settling time for 2% band, in second, is
- (A) 1.5 (B) 2.0
(C) 3.0 (D) 4.0
180. If the characteristic equation of a closed-loop system is $s^2 + 2s + 2 = 0$, then the system is
- (A) Over damped (B) Critically damped
(C) Under damped (D) Un damped
181. Compared to uncompensated system, PD controlled compensated system has
- (A) A higher type number (B) Reduced damping
(C) Higher noise amplification (D) Larger transient overshoot
182. A system with an input $x(t)$ and an output $y(t)$ is described by the relation $y(t) = tx(t)$. This system is
- (A) Linear and time invariant (B) Linear and time varying
(C) Non linear and time invariant (D) Non linear and time varying
183. Base thickness of modern bipolar transistors can be as small as
- (A) 1 μm (B) 0.1 μm
(C) 10 nm (D) 10 A^0
184. Consider a feedback control system with open loop transfer function $G(s)H(s) = K(1 + 0.5s) / [s(1 + s)(1 + 2s)]$. The type of closed loop system is
- (A) zero (B) one
(C) two (D) three
185. The Nyquist plot of a loop transfer function $G(j\omega)H(j\omega)$ of a system enclose the $(-1, j0)$ point. The gain margin of the system is
- (A) Less than zero (B) zero
(C) Greater than zero (D) infinity
186. A common emitter amplifier, with a self bias circuit to bias the transistor in the active region is an example of
- (A) Class A amplifier (B) Class AB amplifier
(C) Class B amplifier (D) Class C amplifier

187. A Schmitt trigger circuit achieves hysteresis by utilizing
- (A) The magnetic properties of transformer core
 (B) Avalanche multiplication in a Zener diode
 (C) The Barkhausen principle
 (D) Regenerative positive feedback
188. The unit impulse response of a system is $h(t) = e^{-t}u(t)$. For this system, the steady state value of the output is equal to
- (A) -1 (B) 0
 (C) 1 (D) ∞
189. The phase shift oscillator requires
- (A) 180° phase shift from RC network (B) 360° phase shift from RC network
 (C) 0° phase shift from RC network (D) 90° phase shift from RC network
190. Colpitts oscillator circuit uses
- (A) Two capacitors and one inductor (B) Two inductors and one capacitor
 (C) One inductor and one capacitor (D) Three inductors
191. Which one of the following is correct statement about the system if it is characterized by the equation $y(t) = ax(t) + b$?
- (A) Linear for $b = 0$ (B) Linear if $b > 0$
 (C) Linear if $b < 0$ (D) Nonlinear for all values of b
192. Which one of the following systems is a causal system ?
- (A) $y(t) = \sin(t + 3)$ (B) $y(t) = u(t) + u(t-1)$
 (C) $y(t) = u(t) + u(t + 1)$ (D) $y(t) = \sin(t-3) + \sin(t + 3)$
193. A delayed version of the signal $f(t)$ is
- (A) $f(t - 3)$ (B) $f(t + 3)$
 (C) $f(t) + f(t - 3)$ (D) $f(t) + f(t + 3)$
194. A periodic signal is represented by
- (A) $x(t) = x(t + T)$ (B) $x(t) = x(t / T)$
 (C) $x(t) = x(t^T)$ (D) $x(t) = x(2T)$
195. Period of the signal $x(t) = \sin(\pi t)$ is
- (A) 1 (B) 4
 (C) 3 (D) 2

196. FIR Digital filters are
- (A) Always stable (B) Conditionally stable
 (C) Having nonlinear phase (D) Having Ideal frequency response
197. Noise is a/an
- (A) Deterministic signal (B) Periodic signal
 (C) Random signal (D) Exponential signal
198. Information content of a message with probability p is defined by the equation
- (A) $I = \log_2(1 / p)$ (B) $I = \log_2(p)$
 (C) $I = p \log_2(1 / p)$ (D) $I = p / \log_2(1 / p)$
199. The sum of two or more arbitrary sinusoids is
- (A) Always periodic
 (B) Periodic under certain conditions
 (C) Never periodic
 (D) Periodic only if all sinusoids are identical in frequency and phase
200. Pulse code modulation requires signal
- (A) Sampling and quantizing only (B) Quantizing and digitizing only
 (C) Digitizing only (D) Sampling, quantizing and digitizing
201. A 4-bit modulo-16 ripple counter uses JK flip flops. If the propagation delay of each flip flop is 50 ns, the maximum clock frequency that can be used is equal to
- (A) 20 MHz (B) 10 MHz
 (C) 5 MHz (D) 4 MHz
202. With 2's complement representation, the range of values that can be represented on data bus of an 8-bit microprocessor is given by
- (A) -128 to 127 (B) -128 to 128
 (C) -127 to 128 (D) -256 to 256
203. A function of one or more variables which conveys information on the nature of physical phenomena is called
- (A) noise (B) interference
 (C) system (D) signal

204. Compared to a parallel adder, a serial adder is
(A) Faster and requires more hardware
(B) Slower and requires more hardware
(C) Faster and requires less hardware
(D) Slower and requires less hardware
205. Emitter bypass capacitors cause a
(A) High frequency pole in the transfer function
(B) A high pass response
(C) A low-pass response
(D) A high frequency zero in the transfer function
206. The ramp function can be obtained from the unit impulse at $t = 0$ by
(A) Differentiating unit impulse function once
(B) Differentiating unit impulse function twice
(C) Integrating unit impulse function once
(D) Integrating unit impulse function twice
207. The criterion for oscillations to occur in a feedback loop is known as
(A) Barkhausen criterion (B) Nyquist criterion
(C) Routh-Hurwitz criterion (D) Shannon's criterion
208. Directive gain of an antenna is
(A) Inversely proportional to the beam width
(B) Directly proportional to the beam width
(C) independent of the beamwidth
(D) always constant
209. When a sinusoidal voltage of maximum 1V is applied to a pure capacitance, current of maximum 1 A flows through the circuit. The average power in the circuit is
(A) 0 W (B) 0.707 W
(C) 0.5 W (D) 1.0 W
210. The development of nodal equations is based on
(A) KVL (B) KCL
(C) Ohm's law (D) Ampere's law

211. Negative feedback in amplifiers
- (A) Decreases gain (B) Increases gain
(C) Maintains gain (D) Makes the gain infinite
212. In a multistage R-C coupled amplifier,
- (A) There is no DC component in the output
(B) There is no distortion in the output
(C) There are no even harmonics in the output
(D) There are no odd harmonics in the output
213. A change in the value of the emitter resistance R_e , in a BJT differential amplifier
- (A) Affects the difference mode gain A_d
(B) Affects the common mode gain A_c
(C) Affects both A_d and A_c
(D) Does not affect either A_d or A_c
214. The common emitter short circuit gain β of a transistor
- (A) Increases with collector current I_C
(B) Decreases with collector current I_C
(C) Increase, becomes maximum and decrease with increase of I_C
(D) Is not a function of I_C
215. A class A transformer coupled transistor power amplifier is required to deliver a power output of 10 watts. The maximum power rating of the transistor should not be less than
- (A) 5 W (B) 10 W
(C) 20 W (D) 40 W
216. Reverse saturation current in the collector region of a transistor
- (A) Increases with temperature (B) Decreases with temperature
(C) Is not affected by temperature (D) Is affected by base current
217. Which of the following constitute the objective of impedance matching ?
- (A) Increase power transfer to the load
(B) Decrease power transfer to the load
(C) Decrease losses
(D) Increase efficiency

218. A cascode amplifier stage is equivalent to
 (A) A CE stage followed by CB stage (B) A CB stage followed by CC stage
 (C) A CC stage followed by CB stage (D) A CB stage followed by CE stage
219. In a differential amplifier, CMRR can be increased by increasing
 (A) Emitter resistance (B) Collector resistance
 (C) Power supply voltage (D) Source resistance
220. In a current-shunt negative feedback amplifier, as compared to the basic amplifier,
 (A) Both input and output impedances decrease
 (B) Input impedance decreases but output impedance increases
 (C) Input impedance increases but output impedance decreases
 (D) Both input and output impedances increase
221. A high Q quartz crystal exhibits series resonance at the frequency ω_s and parallel resonance at the frequency ω_p . Then,
 (A) ω_s is very close to but less than ω_p
 (B) $\omega_s \ll \omega_p$
 (C) ω_s is very close to but greater than ω_p
 (D) $\omega_s \gg \omega_p$
222. In a series regulated power supply circuit, the voltage gain A_V of the pass transistor satisfies the condition
 (A) $A_V \rightarrow \infty$ (B) $1 \ll A_V < \infty$
 (C) $A_V \approx 1$ (D) $A_V \ll 1$
223. Crossover distortion is the characteristic of
 (A) Class A output stage (B) Class B output stage
 (C) Class AB output stage (D) Common base output stage
224. A DC power supply has a no load voltage of 30 V and a full load voltage of 25 V at a full load current of 1 A. Its output resistance and load regulation are, respectively,
 (A) 5 ohm and 20% (B) 25 ohm and 20%
 (C) 5 ohm and 16.7% (D) 25 ohm and 16.7%
225. The ideal OP-AMP has the following characteristics:
 (A) $R_i = \infty, A = \infty, R_o = 0$ (B) $R_i = 0, A = \infty, R_o = 0$
 (C) $R_i = \infty, A = \infty, R_o = \infty$ (D) $R_i = 0, A = \infty, R_o = \infty$

226. Consider the given statements:
1. Astable multivibrator can be used for generating square wave.
 2. Bistable multivibrator can be used for storing binary information.
- (A) Only statement 1 is correct
 (B) Only statement 2 is correct
 (C) Both statements 1 and 2 are correct
 (D) Both statements 1 and 2 are incorrect
227. In negative feedback amplifier using voltage series feedback,
- (A) Both R_i and R_o decrease (B) R_i decreases and R_o increases
 (C) R_i increases and R_o decreases (D) Both R_i and R_o increase
228. A 741 OP-AMP has a gain-bandwidth product of 1 MHz. A non-inverting amplifier using this OP-AMP and having a voltage gain of 20 dB will exhibit a -3 dB bandwidth of
- (A) 50 kHz (B) 100 kHz
 (C) 200 kHz (D) 10 kHz
229. Unit of slew rate of an OP-AMP is
- (A) Volt / sec (B) Volt sec
 (C) Volt (D) Amp
230. If the differential voltage gain and the common mode voltage gain of a differential amplifier are 48 dB and 2 dB respectively, then its CMRR is
- (A) 23 dB (B) 25 dB
 (C) 46 dB (D) 50 dB
231. Generally, the gain of a transistor amplifier falls at high frequencies due to the
- (A) Internal capacitance of the device (B) Coupling capacitor at the input
 (C) Skin effect (D) Coupling capacitor at the output
232. An amplifier without feedback has a voltage gain 50 and input resistance of 1 k Ω . The input resistance of the current-shunt negative feedback amplifier using the above amplifier with a feedback factor of 0.2 is
- (A) 1 / 11 k Ω (B) 1 / 5 k Ω
 (C) 5 k Ω (D) 11 k Ω

233. Three identical amplifiers with each one having voltage gain of 10, input resistance of $1\text{ k}\Omega$ and output resistance of 250Ω are cascaded. The open circuit voltage gain of the combined amplifier is
- (A) 1000 (B) 100
(C) 30 (D) 50
234. Zener diode is suitable as a/an
- (A) rectifier (B) amplifier
(C) filter (D) Voltage regulator
235. An ideal OP-AMP is an ideal
- (A) Voltage controlled current source (B) Voltage controlled voltage source
(C) Current controlled current source (D) Current controlled voltage source
236. The Ebers-Moll model is applicable to
- (A) Bipolar Junction Transistor (B) NMOS transistor
(C) Unipolar Junction Transistor (D) Junction FET
237. In C language, the key words are also called
- (A) Special words (B) Reserve words
(C) Class words (D) Character words
238. Which of the following can not be used as a variable name in C ?
- (A) else (B) coal
(C) ram (D) vندی
239. The operating state that distinguishes a silicon controlled rectifier (SCR) from a diode is
- (A) Forward conducting state (B) Forward blocking state
(C) Reverse conducting state (D) Reverse blocking state
240. LVDT is a
- (A) Pressure transducer (B) Displacement transducer
(C) Velocity transducer (D) Acceleration transducer
241. A transmission line whose characteristic impedance is pure resistance
- (A) Must be a lossless line (B) Must be a distortion less line
(C) May not be a lossless line (D) May not be a distortion less line

242. The depth of penetration of wave in a lossy dielectric increases with increasing
 (A) conductivity (B) permeability
 (C) wavelength (D) permittivity
243. A TEM wave is incident normally upon a perfect conductor. The E and H fields at the boundary will be respectively
 (A) Minimum and minimum (B) Maximum and maximum
 (C) Minimum and maximum (D) Maximum and minimum
244. Which of the following is not a keyword in C ?
 (A) pop (B) for
 (C) if (D) union
245. A uniform plane electromagnetic wave incident normally on a plane surface of a dielectric material is reflected with VSWR of 3. What is the percentage of incident power that is reflected ?
 (A) 10 (B) 25
 (C) 50 (D) 75
246. The magnitude of the open circuit and short circuit impedance of a transmission line are 100 Ω and 25 Ω respectively. The characteristic impedance of the line is
 (A) 25 Ω (B) 50 Ω
 (C) 75 Ω (D) 100 Ω
247. Refractive index of glass is 1.5. What is the wavelength of a beam of light with a frequency of 10^{14} Hz in glass ? Assume velocity of light in vacuum to be 3×10^8 m/sec.
 (A) 3 μm (B) 3 mm
 (C) 2 μm (D) 1 μm
248. A PIN diode is
 (A) A metal semiconductor point contact diode
 (B) A microwave mixer diode
 (C) Often used as a microwave detector
 (D) Suitable for use as a microwave switch
249. Modern day optical fibers have losses of the order of
 (A) 10 dB / km (B) 1 dB / km
 (C) 20 dB / km (D) 100 dB / km

250. Sensitivity of optical receivers is measured in
 (A) W / A (watt per ampere) (B) A / W (ampere / watt)
 (C) WA (watt ampere) (D) W (watt)
251. Which of the following is NOT LED material ?
 (A) GaAs (B) GaP
 (C) SiC (D) SiO₂
252. The main drawback of JFET is its
 (A) High input impedance (B) Low input impedance
 (C) Higher noise (D) Lower gain
253. The line integral of vector potential A around the boundary of a surface S represents
 (A) Flux through the surface S (B) Flux density in the surface S
 (C) Magnetic density (D) Current density
254. Inside a hollow conducting sphere
 (A) Electric field is zero
 (B) Electric field is non zero constant
 (C) Electric field changes with the magnitude of the charge given to the conductor
 (D) Electric field changes with distance from the centre of the sphere
255. Input impedance of half wave dipole antenna is
 (A) 73 + j 42.5 ohm (B) 277 ohm
 (C) 122 ohm (D) 43 ohm
256. When the plate area of a parallel plate capacitor increases keeping the capacitor voltage constant, the force between the plates
 (A) increases (B) decreases
 (C) remains constant (D) may increase or decrease
257. Fourier transform of unit step signal is given by
 (A) $\pi\delta(\omega)$ (B) $1 / j \omega$
 (C) $(1 / j \omega) + \pi\delta(\omega)$ (D) 1
258. Time division multiplexing (TDM) is possible with
 (A) Analog signals (B) Digital signals
 (C) Both analog and digital signals (D) Periodic signals

259. The dominant mode in a rectangular waveguide has
 (A) No attenuation (B) No cut-off
 (C) No magnetic field component (D) The highest cut-off wavelength
260. The frequency of the driving network connected between pin 1 and 2 of a 8085 must be
 (A) Equal to the desired clock frequency
 (B) Twice the desired clock frequency
 (C) Four times the desired clock frequency
 (D) Eight times the desired clock frequency
261. Which semiconductor power device out of the following is NOT a current triggered device ?
 (A) thyristor (B) G.T.O
 (C) triac (D) MOSFET
262. The triac can be used only in
 (A) inverter (B) rectifier
 (C) chopper (D) amplifier
263. Which of the following does not cause permanent damage of an SCR ?
 (A) High current (B) High rate of rise of current
 (C) High temperature rise (D) High rate of rise of voltage
264. In a thyristor DC chopper, which type of commutation results in best performance ?
 (A) Voltage commutation (B) Current commutation
 (C) Load commutation (D) Supply commutation
265. A six pulse thyristor rectifier bridge is connected to a balanced 50 Hz, three phase AC source. Assuming that the DC output current of rectifier is constant, the lowest frequency harmonic component in the AC source line current is
 (A) 100 Hz (B) 150 Hz
 (C) 250 Hz (D) 300 Hz
266. A step down chopper is operated in the continuous conduction mode in steady state with constant duty ratio D . If V_o is the magnitude of the DC output voltage and if V_s is the magnitude of the DC input voltage, the ratio V_o / V_s is given by
 (A) D (B) $1 - D$
 (C) $1 / (1 - D)$ (D) $D / (1 - D)$

267. If Z-transform of $x(n)$ is $X(z)$, then Z-transform of $x(-n)$ is
 (A) $X(z^2)$ (B) $X(z^{-1})$
 (C) $X(z)$ (D) $-X(z)$
268. Inverters find applications in
 (A) UPS (B) DC drives
 (C) HVAC transmission (D) rectifiers
269. The gate current required to turn on an SCR is
 (A) Few amperes (B) Few milliamperes
 (C) Almost equal to anode current (D) About 50% of anode current
270. When a thyristor is negatively biased,
 (A) All the three junctions are negatively biased
 (B) Outer junctions are positively biased and the inner junction is negatively biased
 (C) Outer junctions are negatively biased and the inner junctions are positively biased
 (D) The junction near the anode is negatively biased and the one near cathode is positively biased
271. A single phase voltage source square wave inverter feeds pure inductive load. The waveform of the load current will be
 (A) sinusoidal (B) rectangular
 (C) trapezoidal (D) triangular
272. In a photodiode, light is focused to fall on
 (A) p -region only (B) n-region only
 (C) Full p and n regions (D) Junction region only
273. Thevenin resistance can be found by taking the ratio (o.c = open circuit, s.c = short circuit, V_s = supply voltage, V_L = load voltage)
 (A) V_{oc} / I_{sc} (B) V_{sc} / I_{oc}
 (C) V_s / I_s (D) V_L / I_L
274. Norton's equivalent circuit is
 (A) Voltage source in parallel with resistance
 (B) Current source in series with resistance
 (C) Current source in parallel with resistance
 (D) Voltage source in series with resistance

275. In order to obtain static voltage equalization in series connected SCRs, connections are made of
- (A) One resistor across the string
 - (B) Resistors of different values across each SCR
 - (C) Resistors of same values across each SCR**
 - (D) One resistor in series with the string
276. h-parameter indicating input resistance in a common emitter circuit is
- (A) h_{fe} (B) h_{re}
 - (C) h_{oe} **(D) h_{ie}**
277. A voltage source inverter is normally employed when
- (A) Source inductance is large and load inductance is small
 - (B) Source inductance is small and load inductance is large**
 - (C) Both source and load inductances are small
 - (D) Both source and load inductances are large
278. The output voltage waveform of a three phase square wave inverter contains
- (A) Only even harmonics (B) Both even and odd harmonics
 - (C) Only odd harmonics** (D) Only triple harmonics
279. Spectrum of square wave contains
- (A) Only even harmonics
 - (B) Fundamental and only odd harmonics**
 - (C) Both even and odd harmonics
 - (D) DC component, even and odd harmonics
280. Modulation can be explained by the following property of the Fourier transform:
- (A) Time shifting **(B) Frequency shifting**
 - (C) differentiation (D) integration
281. The OP-AMP integrator circuit contains
- (A) Resistor in the feedback path **(B) Capacitor in the feedback path**
 - (C) Inductor in the feedback path (D) Short circuit in the feedback path
282. A Kelvin double bridge is best suited for the measurement of
- (A) inductance (B) capacitance
 - (C) low resistance** (D) high resistance

283. Noise in FM receiver is reduced by
(A) amplifier (B) AFC
(C) Limiter (D) detector
284. The moving coil in a dynamometer wattmeter is connected
(A) In series with the fixed coil (B) Across the supply
(C) In series with the load (D) Across the load
285. The primary current in a current transformer is dictated by
(A) The secondary burden (B) The core of transformer
(C) The load current (D) None of the above
286. A moving coil galvanometer is converted into a DC ammeter by connecting
(A) A low resistance across the meter
(B) A high resistance in series with the meter
(C) A pure inductance across the meter
(D) A capacitor in series with the meter
287. A single channel digital storage oscilloscope uses a 10 bit, 10^7 samples per second ADC. For a 100 kHz sine wave input, the number of samples taken per cycle of the input will be
(A) 10^7 (B) 10^4
(C) 10^3 (D) 10^2
288. If an AC voltage wave is corrupted with an arbitrary number of harmonics, then the voltage waveform differs from its fundamental frequency component in terms of
(A) Only the peak value
(B) Only the RMS value
(C) Only the average value
(D) All the three (peak, RMS, average) values
289. If there are sign changes in the first column of Routh's array, the system is
(A) stable (B) unstable
(C) unpredictable (D) unrealizable
290. The effect of stray magnetic fields on the actuating torque of a portable instrument is maximum when the operating field of the instrument and the stray fields are
(A) perpendicular (B) parallel
(C) Inclined at 60° (D) Inclined at 30°

291. Convolution of two time domain functions is equivalent to
(A) multiplying their Fourier transforms in frequency-domain
(B) multiplying their first derivatives in frequency-domain
(C) multiplying their second derivatives in frequency-domain
(D) dividing their Fourier transforms in frequency-domain
292. Transient response of R-L circuit can be obtained with
(A) Unit step signal **(B)** Sinusoidal signal
(C) DC signal **(D)** Periodic signal
293. Time constant in series RC circuit is given by the product
(A) R^2C **(B)** R^2C^2
(C) RC **(D)** RC^2
294. For telegraphy, the most commonly used modulation system is
(A) FSK **(B)** PCM
(C) AM **(D)** PWM
295. Which device is used in relaxation oscillator ?
(A) SCR **(B)** diac
(C) triac **(D)** UJT
296. DC-DC converter circuit is known as
(A) inverter **(B)** rectifier
(C) chopper **(D)** load regulator
297. The range of values for data type int in C language is
(A) -128 to 128 **(B)** -255 to 255
(C) -32768 to 32767 **(D)** -128 to 127
298. An AC current of 5 A and DC current of 5A flow simultaneously through a circuit. Which of the following statements is true ?
(A) An AC ammeter will read less than 10 A but more than 5A
(B) An AC ammeter will read only 5A
(C) A DC ammeter will read 10 A
(D) A DC ammeter will read zero

299. Region of convergence for Z-transform of unit impulse is
- (A) region inside unit circle in z-plane
 - (B) region outside unit circle in z-plane
 - (C) entire z-plane**
 - (D) unit circle in z-plane
300. Which of the following bridges can be used for the measurement of dielectric loss of a capacitor ?
- (A) Schering bridge**
 - (B) Maxwell's bridge
 - (C) Owen bridge
 - (D) Anderson bridge