

046/2016

Maximum : 100 marks

Time : 1 hour and 15 minutes

1. The distribution of electrons in the conduction band is given by :
 - (A) (density of quantum states) \times (energy of a state)
 - (B) (density of quantum states) \times (probability a state is occupied)
 - (C) (energy of quantum states) \times (probability a state is occupied)
 - (D) (energy of quantum states) \times (chemical potential of a state)

2. Temperature coefficient of diode at room temperature is
 - (A) $-1.22 \text{ mV}/^\circ \text{C}$
 - (B) $-1.42 \text{ mV}/^\circ \text{C}$
 - (C) $-1.62 \text{ mV}/^\circ \text{C}$
 - (D) $-1.82 \text{ mV}/^\circ \text{C}$

3. When the reverse bias increases for a diode, the PN junction capacitance :
 - (A) Increases, exhibiting inverse square relation
 - (B) Decreases, exhibiting inverse square relation
 - (C) Decreases, exhibiting inverse square root relation
 - (D) Increases, exhibiting inverse square root relation

4. Consider an ideal intrinsic semiconductor in thermal equilibrium. No external forces or fields are applied to this semiconductor. At temperatures above 0 K, the electron concentration in the conduction band is non-zero because :
 - (A) some electrons from dopant atoms will overcome the bandgap by gained thermal energy
 - (B) some electrons from the conduction band will overcome the bandgap by gained thermal energy
 - (C) some electrons from dopant atoms will overcome the ionization energy by gained thermal energy
 - (D) some electrons from the valence band will overcome the bandgap by gained thermal energy .

5. A junction FET has the following parameters. $I_{DSS} = 20 \text{ mA}$, Pinch off voltage = 5V. The gate source cut off voltage is :
 - (A) -5 V
 - (B) 5 V
 - (C) 10 V
 - (D) -10 V

6. The capacitance in parallel with forward biased base emitter terminals of a transistor is known as :
 - (A) Depletion Capacitance
 - (B) Drift Capacitance
 - (C) Diffusion Capacitance
 - (D) Doping Capacitance

7. Due to Early effect, for a transistor :
- (A) Output resistance increases (B) Input resistance increases
(C) Input resistance decreases (D) Output resistance decreases
8. In a MOSFET, the drain current slightly Increases as the drain source voltage increases. The phenomenon is known as :
- (A) Hot electron effect (B) Channel length Modulation
(C) Base width modulation (D) Sub threshold conduction
9. A MOSFET has a channel length $1\mu m$. What value of V_{DS} will cause the electrons to reach saturation velocity :
- (A) 1 V (B) 5 V
(C) 10 V (D) 15 V
10. In the devices given below, maximum switching speed is available with :
- (A) SCR (B) POWER MOSFET
(C) IGBT (D) DIAC
11. The voltage gain for a differential amplifier, with the following specification $A= 100$, $R_{id} = 100 K \Omega$, $R_O = 100 \Omega$, $R_s = 10 K \Omega$ and $R_L = 1,000 \Omega$:
- (A) 19.15 dB (B) 38.3 dB
(C) 57.45 dB (D) 76.6 dB
12. The intrinsic voltage gain, μ_f of the BJT is :
- (A) $g_m * r_o$ (B) $g_m * (1 + r_o)$
(C) $g_m * (1 - r_o)$ (D) $g_m * (r_o / (1 - r_o))$
13. If ground is applied to the (+) terminal of an inverting op-amp, the (-) terminal will :
- (A) not need an input resistor (B) be virtual ground
(C) have high reverse current (D) not invert the signal
14. Terminal current gain for the common emitter amplifier is :
- (A) ratio of Collector current to Base current
(B) ratio of current delivered to load to current supplied to base
(C) β of the transistor
(D) all the above

15. Negative feedback in transistor amplifier has the advantage of :
- (A) Extended bandwidth (B) Improved loop gain
(C) Increased harmonic distortion (D) All the above
16. The feedback in an amplifier circuit reduces the gain to 50%. The feedback factor is :
- (A) -1.5 dB (B) -0.5 dB
(C) -3 dB (D) 1.5 dB
17. For an LC tuned circuit, :
- (A) When the capacitor energy is maximum, the inductor energy is minimum
(B) When the capacitor current is maximum, the inductor current is minimum
(C) When the capacitor voltage is maximum, the inductor voltage is minimum
(D) When the capacitor voltage is maximum, the inductor energy is minimum
18. Fastest of all logic families :
- (A) Emitter coupled logic (B) Resistor Transistor logic
(C) CMOS logic (D) Transistor - Transistor logic
19. AD 670 is a :
- (A) Successive approximation ADC (B) Dual slope ADC
(C) Counter ramp ADC (D) Flash ADC
20. Noise due to random emission of electrons associated with charge flowing across a potential barrier is known as :
- (A) Thermal Noise (B) White Noise
(C) Cosmic Noise (D) Shot Noise
21. A broadcast radio transmitter radiates 5 kW power when the modulation percentage is 60%. The carrier power is :
- (A) 1.19 kW (B) 3.12 kW
(C) 4.23 KW (D) 6.46 kW
22. The advantage of DSB over SSB full carrier AM is :
- (A) Less available channel space
(B) More stable transmitter gives better reception
(C) More power to transmit same signal
(D) Signal is less resistant to noise

23. Double side band modulator is used to obtain :
- (A) Double side band suppressed carrier signal
 - (B) Single side band suppressed carrier signal
 - (C) Double side band signal
 - (D) Single side band signal
24. VSB modulation is preferred in TV because :
- (A) it avoids phase distortion at low frequencies
 - (B) it reduces the bandwidth requirement to half
 - (C) it results in better reception
 - (D) all the above
25. Which of the following is the indirect way of FM generation?
- (A) Reactance bipolar transistor modulator
 - (B) Armstrong modulator
 - (C) Varactor diode modulator
 - (D) Reactance FM modulator
26. An FM signal with a deviation δ is passed through a mixer and has its frequency reduced to half. The deviation in the output of the mixture is :
- (A) $\delta/2$
 - (B) 2δ
 - (C) $\delta/4$
 - (D) δ
27. A 1000 kHz carrier is simultaneously modulated with 300 Hz, 800 Hz and 2 kHz audio sine waves. Which of the following frequency is least likely to be present in the output?
- (A) 1002 kHz
 - (B) 1000 kHz
 - (C) 999.2 kHz
 - (D) 998.0 kHz
28. In the spectrum of a FM wave :
- (A) The carrier frequency disappears when the modulation index is large
 - (B) The amplitude of any side band depends upon the modulation index
 - (C) The total number of side band depends upon modulation index
 - (D) The number of side bands increase with increase in modulation frequency
29. Amplitude limiting action is achieved in :
- (A) Foster-Seely discriminator
 - (B) Quadrature Detector
 - (C) PLL demodulator
 - (D) Ratio detector

30. Consider the following :

1. Generation of SSB signals
2. Design of minimum phase type filters
3. Representation of band pass signals

Which of the above applications is Hilbert transform used?

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

31. Main disadvantage of PCM is :

- (A) It needs large bandwidth (B) It is incompatible with FDM
(C) High error rate (D) In compatible with time sharing

32. In phase shift keying the input signal is

- (A) $s_1(t) = A \cos \omega_0 t$ and $s_2(t) = -A \cos \omega_0 t$
(B) $s_1(t) = s_2(t) = A \cos \omega_0 t$
(C) $s_1(t) = A \cos \omega_0 t$ and $s_2(t) = A \cos(\omega_0 t + \pi/2)$
(D) $s_1(t) = A \cos \omega_0(t)$ and $s_2(t) = -A \cos(\omega_0 t + \pi/2)$

33. Rather than sending the absolute value of each sample, it is possible to achieve a smaller transmission bit-rate by sending the difference between consecutive samples. This is known as :

- (A) delta-sigma modulation (B) delta modulation
(C) adaptive delta modulation (D) differential PCM

34. The impulse response of a linear interpolator is :

- (A) A square pulse (B) Rectangular pulse
(C) Linear ramp (D) Triangular pulse

35. Compandor, in digital communication refers to :

- (A) Compressor (B) Expander
(C) Both (A) and (B) (D) None of the above

36. Slotted frequency hopping is :

- (A) Synchronous frequency hopping (B) Sequential frequency hopping
(C) Random frequency hopping (D) Asynchronous frequency hopping

37. Bit length of a pseudo noise code, having m stage shift register is :

- (A) 2^m (B) 2^{m-1}
(C) $2^m - 1$ (D) 2^{m+1}

38. The rate of change at the output of the modulator is :
- (A) Bit rate (B) Baud rate
(C) Deviation rate (D) Pulse rate
39. What is false for a Frequency Hopping Spread spectrum?
- (A) It is not affected by near far problem
(B) It is affected by near far problem
(C) It has multiple frequency bands
(D) The carrier frequency randomly changes among different slots
40. The ratio of the bandwidth of spreaded signal to the bandwidth of the unspreaded signal is termed as :
- (A) Band rejection ratio (B) Band width factor
(C) Processing gain (D) Processing factor
41. In a broadcast superheterodyne receiver having no RF amplifier, the loaded Q of the antenna coupling circuit is 100. If the intermediate frequency is 455 kHz. The rejection ratio at 25 MHz will be :
- (A) 1.116 (B) 1.386
(C) 2.116 (D) 2.386
42. Most antenna consisting of a 50 meter long vertical conductor operates over a perfectly conducting ground plane. It is base fed at a frequency of 600 kHz. The radiation resistance of the antenna in ohms is :
- (A) $\frac{2\pi^2}{5}$ (B) $\frac{\pi^2}{5}$
(C) $\frac{4\pi^2}{5}$ (D) $20\pi^2$
43. Diffraction of electromagnetic waves :
- (A) is caused by reflections from the ground
(B) arises only with spherical wavefronts
(C) will occur when the wave pass through a large slot
(D) will occur around the edge of a sharp obstacle
44. The filter which provides full luminance bandwidth without destroying precious high frequency information :
- (A) Trap filter (B) Comb filter
(C) Chroma Filter (D) Luma Filter

45. White dots and cross latch patterns are called :
- (A) Divergence patterns (B) Convergence patterns
(C) Linear patterns (D) Back ground patterns
46. Magnitude of the signal formed by Q and I represents :
- (A) Hue (B) Brightness
(C) Contrast (D) Color Saturation
47. JPEG 2000 standard uses :
- (A) DCT transformation (B) Hilbert transformation
(C) Wavelet transformation (D) DST transformation
48. The dispersion is caused by the shape and index profile of the fibre core is :
- (A) Waveguide dispersion (B) Modal dispersion
(C) Chromatic dispersion (D) Material dispersion
49. Numerical Aperture for a multimode fiber is in the range of :
- (A) 0 to 0.1 (B) 0.1 to 0.2
(C) 0.2 to 0.3 (D) 0.3 to 0.4
50. Noise caused by reflections returning a portion of the optical signal back into the laser cavity is termed as :
- (A) Relative Intensity noise (B) Phase noise
(C) Drift (D) Intercavity noise
51. The I/O port that does not have a dual-purpose role is :
- (A) Port 3 (B) Port 2
(C) Port 1 (D) Port 0
52. After reset, SP register is initialized to address :
- (A) 6H (B) 7H
(C) 8H (D) 9H
53. Which of the following statement is incorrect with watchdog control register, when an external RESET is applied :
- (A) Watchdog run bit is set to OFF (B) Watchdog run bit is set to ON
(C) Watch dog time out flag is cleared (D) Auto load takes place
54. When 8051 Microcontroller is interfaced with RS 232 :
- (A) No extra hardware needed for connection
(B) Current Buffer is connected in between
(C) Line converter is connected in between
(D) V to F converter is connected in between

55. Select the correct statement for 8051 hardware :
- (A) CPU 8 Bit, PC 16 Bit, DPTR 8 bit, PSW 16 Bit, SP 16 Bit
 (B) CPU 8 Bit, PC 8 Bit, DPTR 16 bit, PSW 16 Bit, SP 8 Bit
 (C) CPU 8 Bit, PC 16 Bit, DPTR 8 bit, PSW 8 Bit, SP 16 Bit
 (D) CPU 8 Bit, PC 16 Bit, DPTR 16 bit, PSW 8 Bit, SP 8 Bit
56. With the help of RISC Architecture, PIC16F887 Microcontroller has reduced instruction set. Number of instructions that CPU can recognize is :
- (A) 25 (B) 35
 (C) 45 (D) 55
57. The ADC0804 has _____ resolution.
- (A) 32 bit (B) 16 bit
 (C) 8 bit (D) 4 bit
58. An alternate function of port pin P3.0 (RXD) in the 8051 is :
- (A) serial port input (B) serial port output
 (C) memory write strobe (D) memory read strobe
59. _____ can monitor everything that goes in on-board CPU gives complete visibility into the target code's operation.
- (A) Debugger (B) Simulator
 (C) In Circuit Simulator (D) Logic Analyser
60. ARM Processor Cortex A8, processor mode IRQ refers to
- (A) General purpose interrupt handling
 (B) Fast interrupt handling
 (C) A secure mode for TrustZone
 (D) A protected mode for the Operating System
61. N point DFT of the sequence $\delta(n)$ is :
- (A) $\sum_{n=0}^{N-1} \delta(n)W^{nk} = 1$ (B) $\sum_{n=0}^N \delta(n)W^{nk} = 1$
 (C) $\sum_{n=0}^{N-1} \delta(n)W^{-nk} = 1$ (D) $\sum_{n=1}^{N-1} \delta(n)W^{nk} = 1$
62. If $x(n)$ is having DFT $X(K)$, then the DFT of $x(N-n)$ is :
- (A) $X(K-N)$ (B) $X(N-K)$
 (C) $(X(K-N))/N$ (D) $(X(N-K))/N$