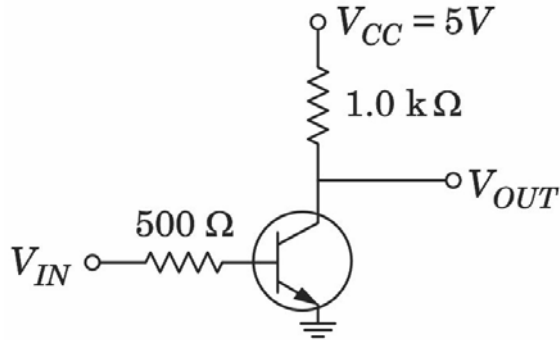


1. The phenomenon known as “Early Effect” in a bipolar transistor refers to a reduction of the effective base-width caused by
- (A) Electron-hole recombination at the base
  - (B) Increase in magnitude of the collector voltage
  - (C) The forward biasing of emitter-base junction
  - (D) The early removal of stored base charge during saturation-to-cutoff switching
  - (E) Answer not known
2. The value of drain current for an N-channel JFET with  $I_{DSS} = 40 \text{ mA}$ ,  $V_p = -10\text{V}$  and  $V_{GS} = -5\text{V}$ , is
- (A) 40 mA
  - (B) 10 mA
  - (C) 160 mA
  - (D) 20 mA
  - (E) Answer not known
3. In a transistor connection, the collector resistance  $R_C = 1\text{k}\Omega$ , Gain  $\beta = 50$ , supply voltage = 3V and  $V_{CE} = \text{IV}$ . The base current is
- (A)  $\frac{1}{25} \text{ mA}$
  - (B)  $\frac{1}{50} \text{ mA}$
  - (C)  $\frac{2}{25} \text{ mA}$
  - (D)  $\frac{1}{10} \text{ mA}$
  - (E) Answer not known

4. In the switching circuit shown below, the minimum value of base current  $I_B$  required to saturate the transistor is \_\_\_\_\_. Assume  $\beta = 200$ , and  $V_{CE(sat)} = 0.3V$ .



- (A)  $20.5\ \mu A$  (B)  $21.5\ \mu A$   
 (C)  $22.5\ \mu A$  (D)  $23.5\ \mu A$   
 (E) Answer not known
5. Which of the following statements are true about BJT and FET?
- (1) BJT is a current controlled device whereas FET is a voltage controlled device
  - (2) BJT amplifier has low gain bandwidth product compared with FET amplifier
  - (3) Voltage gain of FET amplifier is low compared with BJT amplifier
  - (4) Noise due to temperature effect is more in FET compared with BJT
- (A) (1) only  
 (B) (1) and (2) are correct  
 (C) (1) and (3) are correct  
 (D) (1) and (4) are correct  
 (E) Answer not known

6. Consider the following statements :

- (1) FET is an unipolar device
- (2) FET is current controlled and BJT is voltage controlled
- (3) FET is less noisy than BJT
- (4) FETs are less temperature stable compared to BJT

Which of the above statements are correct?

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

7. A BJT common emitter circuit having a collector resistance  $6.8 \text{ k}\Omega$  and a power supply is  $10\text{V}$ . If the transistor operates  $V_{CE} = 3.2\text{V}$ . What is the value of  $I_C$ ?

- (A)  $2 \text{ mA}$
- (B)  $0.1 \text{ mA}$
- (C)  $1 \text{ mA}$
- (D)  $0.2 \text{ mA}$
- (E) Answer not known

8. An N channel enhancement mode MOSFET has a threshold voltage of  $V_{TH} = 1.2V$  and an applied gate to source voltage of  $V_{GS} = 2V$ . Determine the region of operation when  $V_{DS} = 0.4V$ . Assume  $V_{DS}(SAT) = 0.8V$ .
- (A) Non-saturation
  - (B) Saturation
  - (C) Cut off
  - (D) Forward saturation
  - (E) Answer not known
9. A zener diode, when used in voltage stabilization circuits, is biased in the
- (A) Reverse breakdown region
  - (B) Reverse bias region below breakdown voltage
  - (C) Forward bias region
  - (D) Forward bias constant current mode
  - (E) Answer not known
10. In PN junction, the reverse saturation current is of the order of \_\_\_\_\_ for silicon and \_\_\_\_\_ for germanium.
- (A) Nano Amperes (nA) and micro amperes ( $\mu A$ )
  - (B) Micro Amperes ( $\mu A$ ) and nano Amperes (nA)
  - (C) Nano Amperes (nA) and Nano Amperes (nA)
  - (D) Micro Amperes (mA) and nano Amperes (nA)
  - (E) Answer not known

11. The phenomenon of penetrating the charge carriers directly through the potential barrier instead of climbing over it called
- (A) Doping (B) Tunneling  
(C) Conducting (D) Diffusion  
(E) Answer not known
12. For normal operation, A varactor diode is always operated in
- (A) Forward bias  
(B) Reverse bias  
(C) Both bias  
(D) Forward bias with no condition  
(E) Answer not known
13. In PN junction diode, the depletion layer capacitance  $C_T$
- (A) Increases with increase in reverse bias  
(B) Decreases with increase in reverse bias  
(C) Constant with increase in forward bias  
(D) Decreases with increase in forward bias  
(E) Answer not known
14. In PN junction, reverse saturation current ( $I_o$ ) is 5nA at 25°C, then at 45°C
- (A) 30 nA (B) 20 nA  
(C) 15 nA (D) 10 nA  
(E) Answer not known

15. For rectification of very high frequencies i.e. above 300 MHz signals, the following diode may be called or preferred.
- (A) Tunnel diode (B) Schottky diode  
 (C) Varactor diode (D) PN junction diode  
 (E) Answer not known
16. In a bridge rectifier, the peak inverse voltage of each diode is \_\_\_\_\_, where  $V_m$  is the maximum amplitude of the input and  $V_m \gg V_D$ .
- (A)  $V_m$  (B)  $V_m/2$   
 (C)  $2V_m$  (D) 0  
 (E) Answer not known
17. The electron concentration in a piece of silicon maintained at 300 K under equilibrium conditions is  $10^5/\text{cm}^3$ . What is the hole concentration?
- Use intrinsic carrier concentration,  $n_i = 1 \times 10^{10}/\text{cm}^3$
- (A)  $10^5 / \text{cm}^3$   
 (B)  $10^{10} / \text{cm}^3$   
 (C)  $10^{15} / \text{cm}^3$   
 (D)  $10^{20} / \text{cm}^3$   
 (E) Answer not known

18. The forbidden gap for the silicon and germanium at room temperature  $27^{\circ}\text{C}$  is  $300^{\circ}\text{K}$ .
- (A) 0.8 eV and 1.25 eV
  - (B) 0.72 eV and 1.12 eV
  - (C) 0.69 eV and 1.3 eV
  - (D) 0.85 eV and 1.4 eV
  - (E) Answer not known
19. N-type silicon is obtained by doping silicon with
- (A) Germanium
  - (B) Phosphorous
  - (C) Aluminium
  - (D) Indium
  - (E) Answer not known
20. The conductivity of an N-type semiconductor is  $10\text{s/m}$  and its electron mobility is  $50 \times 10^{-4} \text{ m}^2/\text{v} - \text{s}$ . The electron concentration is (assume  $q = 1.6 \times 10^{-19}$ )
- (A)  $12.5 \times 10^{-21} \text{ cm}^3$
  - (B)  $12.5 \times 10^{21} \text{ cm}^{-3}$
  - (C)  $125 \times 10^{15} \text{ m}^{-3}$
  - (D)  $12.5 \times 10^{21} \text{ m}^{-3}$
  - (E) Answer not known

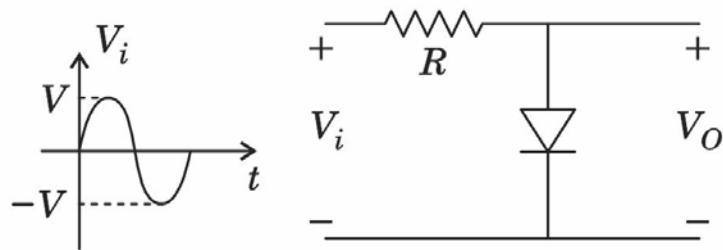
21. Intrinsic carriers per cubic centimeter in Silicon is
- (A)  $1.7 \times 10^6$  (B)  $1.5 \times 10^{10}$   
(C)  $2.5 \times 10^{13}$  (D)  $2.5 \times 10^{10}$   
(E) Answer not known
22. Which of the following is fastest Analog-to-Digital converter?
- (A) Integration type  
(B) Flash type  
(C) Successive approximation type  
(D) Ramp type  
(E) Answer not known
23. In Phase Locked Loop (PLL), the lock state is
- (A) VCO frequency equals input frequency  
(B) VCO frequency not equals input frequency  
(C) Input frequency two times than VCO frequency  
(D) Input frequency greater than VCO frequency  
(E) Answer not known
24. The open loop voltage gain and common-mode rejection ratio of an operational Amplifier is
- (A) Small and much small than unity respectively  
(B) Unity and much smaller than unity respectively  
(C) Large and much larger than unity respectively  
(D) Unity and zero respectively  
(E) Answer not known

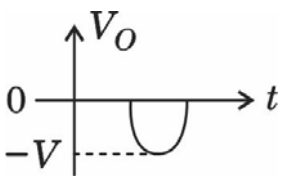
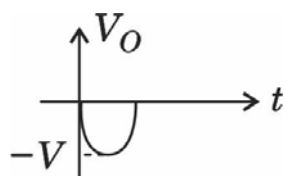
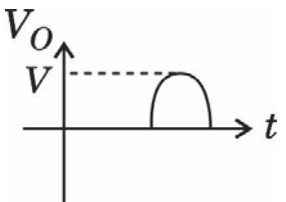
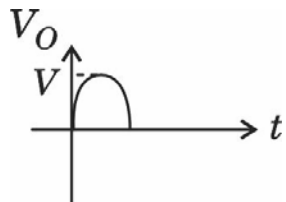


25. For 8 bit DAC whose output are in the range 0 to 10 V. What is the analog output for digital input 1000 0000?

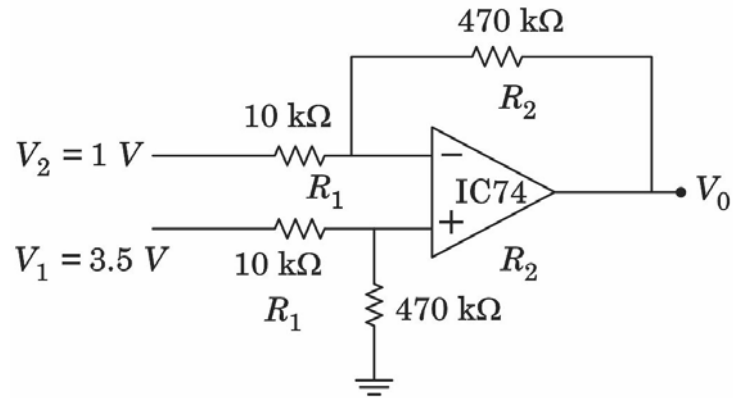
- (A) 2.5 V (B) 5 V  
 (C) 7.5 V (D) 10 V  
 (E) Answer not known

26. Find the output of the given circuit



- (A)  (B)   
 (C)  (D)   
 (E) Answer not known

27. Find the output voltage of given circuit.



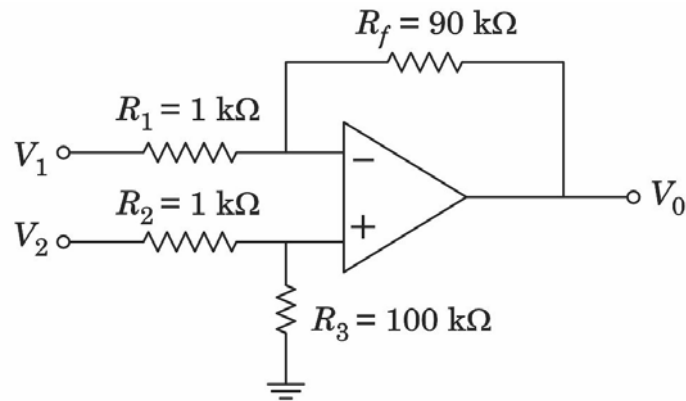
- (A) 100 V (B) 101.5 V  
 (C) 111 V (D) 117.5 V  
 (E) Answer not known

28. Slew rate is called as

- (A) Maximum rate of change of output voltage caused by 0 step i/p voltage  
 (B) Maximum rate of change of o/p current caused by a step i/p current  
 (C) Maximum rate of change of o/p voltage caused by an o/p current  
 (D) Maximum rate of change of i/p voltage caused by a step o/p voltage  
 (E) Answer not known

29. An ideal operational Amplifier has
- (A) A low input resistance and a large output resistance
  - (B) A large input resistance and a low output resistance
  - (C) Equal input and output resistance
  - (D) A low input resistance and a low output resistance
  - (E) Answer not known

30. Obtain the CMRR for the circuit given



- (A) 90.95
- (B) 91
- (C) 101
- (D) 909.5
- (E) Answer not known

31. Match the following :

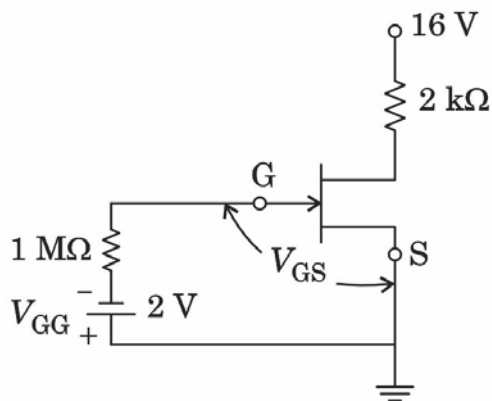
- |                                  |   |
|----------------------------------|---|
| (a) Cascade Amplifier            | 1. Negligible internal feedback   |
| (b) Differential Amplifier       | 2. Has very high input impedance and very high current gain                         |
| (c) Darlington pair CC Amplifier | 3. Provides high common mode voltage rejection                                      |
| (d) Cascode Amplifier            | 4. Used when the input or output impedance is not of the required correct magnitude |

- |     | (a)              | (b) | (c) | (d) |
|-----|------------------|-----|-----|-----|
| (A) | 1                | 3   | 2   | 4   |
| (B) | 4                | 3   | 2   | 1   |
| (C) | 3                | 1   | 2   | 4   |
| (D) | 4                | 2   | 3   | 1   |
| (E) | Answer not known |     |     |     |

32. The essential conditions for maintaining oscillation in the oscillator circuits are
- (A) The magnitude of loop gain must be zero and the total phase-shift around the closed loop is  $180^\circ$
  - (B) The magnitude of loop gain must be unity and the total phase-shift around the closed loop is zero or  $360^\circ$
  - (C) The magnitude of loop gain must be zero and the total phase-shift around the closed loop is  $270^\circ$
  - (D) The magnitude of closed loop gain must be less than 1 and the total phase-shift around the closed loop is  $180^\circ$
  - (E) Answer not known
33. The overall current gain is 3600 in a Darlington connection of two transistors, the value of current gain provided by each transistor is
- (A) 360
  - (B) 60
  - (C) 3600
  - (D) 36
  - (E) Answer not known
34. The operating cycle of class B amplifier is
- (A)  $90^\circ$
  - (B)  $120^\circ$
  - (C)  $180^\circ$
  - (D)  $300^\circ$
  - (E) Answer not known
35. In RC phase shift oscillator which of the following feedback is employed
- (A) Voltage series
  - (B) Voltage shunt
  - (C) Current shunt
  - (D) Current series
  - (E) Answer not known

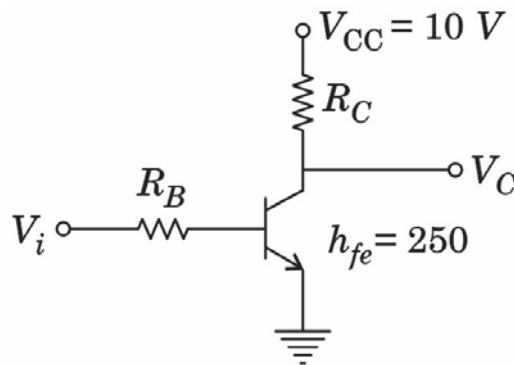
36. The voltage gain ( $A_v$ ) of a common-base amplifier is
- (A) Zero (B) Unity  
 (C) High (D) Less than unity  
 (E) Answer not known

37. Determine  $V_{GSQ}$  and  $I_{DQ}$  for the following network for  $I_{DSS} = 10 \text{ mA}$  and  $V_P = -8 \text{ V}$  ( $V_{GG} = V_{GS}$ )



- (A)  $V_{GSQ} = -2 \text{ V}$ ,  $I_{DQ} = 2.01 \text{ mA}$  (B)  $V_{GSQ} = 0 \text{ V}$ ,  $I_{DQ} = 1.5 \text{ mA}$   
 (C)  $V_{GSQ} = -2 \text{ V}$ ,  $I_{DQ} = 5.625 \text{ mA}$  (D)  $V_{GSQ} = 5 \text{ V}$ ,  $I_{DQ} = 4 \text{ mA}$   
 (E) Answer not known
38. For any BJT amplifier ideally the stability factor has to be
- (A)  $\infty$  (B) 5  
 (C) 1 (D) 0  
 (E) Answer not known

39. Miller theorem in the content of a common emitter amplifier with resistive load describes
- (A) a decrease in high frequency cut-off frequency
  - (B) a decrease in low frequency cut-off frequency
  - (C) an increase in low frequency cut-off frequency
  - (D) an increase in high frequency cut-off frequency
  - (E) Answer not known
40. Determine  $R_B$  and  $R_C$  for the transistor inverter of the figure if  $i_{c\text{sat}} = 10 \text{ mA}$



- (A)  $R_B = 155 \text{ k}\Omega$ ,  $R_C = 1 \text{ k}\Omega$
  - (B)  $R_B = 60 \text{ k}\Omega$ ,  $R_C = 40 \text{ k}\Omega$
  - (C)  $R_B = 1 \text{ k}\Omega$ ,  $R_C = 150 \text{ k}\Omega$
  - (D)  $R_B = 40 \text{ k}\Omega$ ,  $R_C = 60 \text{ k}\Omega$
  - (E) Answer not known
41. A source produces one of four symbols during each interval. The probability of the symbol  $X_4$  is  $P(X_4) = 1/8$ . The information content of the symbol  $X_4$  is
- (A) 2 bits
  - (B) 1 bit
  - (C) 3 bits
  - (D) 4 bits
  - (E) Answer not known

42. A 306W carrier is amplitude modulated simultaneously by two audio waves with modulation percentages of 55 and 65, respectively. The total radiated power after modulation is
- (A) 450 W (B) 490 W  
(C) 550 W (D) 590 W  
(E) Answer not known
43. Find the information capacity of the channel if the channel bandwidth is 100 and SNR is 7.
- (A) 400 (B) 200  
(C) 100 (D) 300  
(E) Answer not known
44. The Digital modulation technique which is easily affected due to channel noise is
- (A) BPSK (B) BFSK  
(C) BASK (D) QPSK  
(E) Answer not known
45. In adaptive delta modulation, the slope overload error is principally in the \_\_\_\_\_ frequency range while quantization error is in the \_\_\_\_\_ frequency range.
- (A) low, low (B) high, high  
(C) high, low (D) low, high  
(E) Answer not known



46. The amplitude of a Sinusoidal signal varies between  $-5V$  and  $5V$ . The signal is quantized by a uniform Quantizer in a PCM System. The minimum number of Quantization levels required to achieve the signal to quantization noise ratio of  $43.8$  dB is
- (A) 32 (B) 64  
(C) 128 (D) 256  
(E) Answer not known
47. Identify the correct statement.
- (1) The noise margin or immunity to noise is proportional to the width of the eye opening.  
(2) The sensitivity of the system to timing errors is revealed by the rate of closing of the eye as sampling timing is varied.
- (A) (1) is true but (2) is false  
(B) (1) is false but (2) is true  
(C) (1) and (2) are false  
(D) (1) and (2) are true  
(E) Answer not known
48. Arrange the following PCM events in chronological order.
- (1) Encoder  
(2) Sampler  
(3) Quantizer  
(4) Low pass filter
- (A) (2), (3), (1), (4) (B) (3), (1), (2), (4)  
(C) (4), (2), (3), (1) (D) (2), (3), (4), (1)  
(E) Answer not known

49. The quantization error problems associated with delta modulation is subjected to two types of noises, they are,
- (A) Slope overload, distortion, white noise
  - (B) Granular noise, thermal noise
  - (C) Granular noise, shot noise
  - (D) Slope overload distortion, granular noise
  - (E) Answer not known
50. Shannon Limit is given by
- (A)  $C = B_W \log_{10} (1 + S/N) \text{ Bits/Second}$
  - (B)  $C = B_W \log_2 (1 + S/N) \text{ Bits/Second}$
  - (C)  $C = B_W \log_2 (1 + N/S) \text{ Bits/Second}$
  - (D)  $C = B_W \log_{10} (1 + N/S) \text{ Bits/Second}$
  - (E) Answer not known
51. A Sinusoidal carrier signal of peak amplitude 5V and frequency 100KHz is amplitude modulated by a 5 KHz signal of peak amplitude 3V. What is the modulation index?
- (A) 1.67
  - (B) 0.5
  - (C) 0.6
  - (D) 1.2
  - (E) Answer not known

52. A signal  $x(t) = 2 \cos(2\pi \cdot 10^4 t + \pi/4)$  is applied to an FM modulator with the sensitivity constant of 10 KHz / Volt. Then the modulation index of the FM wave is
- (A) 4 (B) 2  
(C)  $4/\pi$  (D)  $2/\pi$   
(E) Answer not known
53. A modulator is a device to
- (A) Separate two frequencies  
(B) Impress the information on to a radio frequency carrier  
(C) Extract information from the carrier  
(D) Amplify the audio frequency signal  
(E) Answer not known
54. In an AM transmitter, several sinusoidal message signals are simultaneously modulated with a single sinusoidal carrier, then the increase of number of sinusoidal messages leads to
- (A) The increase of Carrier power  
(B) The same value of side band powers  
(C) The same value of total transmitted power  
(D) The same value of carrier power in the transmitted signal  
(E) Answer not known

55. The rms voltage values of carrier and sideband components of an AM transmitter are 200V and 50V respectively. If the load resistor is  $100\ \Omega$ , the total power in the AM signal is,
- (A) 150 W (B) 250 W  
(C) 450 W (D) 350 W  
(E) Answer not known
56. Calculate the thermal noise power available from any resistor at room temperature (290K) for a Bandwidth of 1MHz, and a value of  $R = 50\ \Omega$
- (A)  $4 \times 10^{-5} W$  (B)  $4 \times 10^{-3} W$   
(C)  $4 \times 10^{-2} W$  (D)  $4 \times 10^{-1} W$   
(E) Answer not known
57. A continuous signal  $x(t)$  is ideally sampled using a unit impulse train with sampling interval (T) sec. Which of the following statements are true about sampled version?
- (i) A sequence of impulses  
(ii) Located at  $t = KT$   
(iii) A periodic version of  $x(t)$  with period (T) sec.
- (A) (i) only  
(B) (i) and (iii) only  
(C) (i) and (ii) only  
(D) (ii) and (iii) only  
(E) Answer not known

58. A random process  $X(t)$  is called wide sense stationary (WSS), If
- (A) A first order moment is not constant
  - (B) Second order moment is variable
  - (C) Auto correlation function is independent of time
  - (D) Auto correlation function is dependent of time
  - (E) Answer not known
59. A stationary process  $x(t)$  is called ergodic process if
- (A) Time average is same as ensemble average
  - (B) Time average is greater than ensemble average
  - (C) Time average is lesser than ensemble average
  - (D) Ensemble average is half of the time average
  - (E) Answer not known
60. Auto correlation function provides
- (A) the measure of similarity between the signal and its energy density spectrum.
  - (B) the measure of similarity between the signal and its delayed version.
  - (C) the measure of similarity between the signal and its unit impulse function.
  - (D) the measure of similarity between the signal and its searching variable.
  - (E) Answer not known

61. A more complicated receiver can have several branches, with each branch synchronized to a different multipath component. This structure is called
- (A) RF Receiver
  - (B) Super heterodyne receiver
  - (C) RAKE Receiver
  - (D) Microwave Receiver
  - (E) Answer not known
62. Find the data rate of an 802.11 a system assuming 16-QAM modulation and rate  $-\frac{2}{3}$  coding
- (A)  $R_{\max} = 30$  Mbps
  - (B)  $R_{\max} = 31$  Mbps
  - (C)  $R_{\max} = 32$  Mbps
  - (D)  $R_{\max} = 33$  Mbps
  - (E) Answer not known
63. How many stages of flip – flops are required to generate PN sequences of Length 31?
- (A) 4 stages
  - (B) 6 stages
  - (C) 5 stages
  - (D) 3 stages
  - (E) Answer not known
64. Since the mobile fading channel is random and time varying, equalizers must track the time varying characteristics of the mobile channel and thus are called
- (A) Linear equalizer
  - (B) Non – linear equalizer
  - (C) Negative equalizer
  - (D) Adaptive equalizer
  - (E) Answer not known

65. The RAKE receiver uses separate \_\_\_\_\_ to detect the \_\_\_\_\_ shifted version of the original CDMA signal with multipath.
- (A) Receivers, phase (B) Correlators, time  
 (C) Correlators, phase (D) Antennas, phase  
 (E) Answer not known
66. Which of the following statements is/are correct regarding OFDM?
- (i) Cyclic prefix is used to overcome ISI  
 (ii) OFDM transmitter can be implemented using FFT  
 (iii) OFDM is a multi carrier modulation technique  
 (iv) OFDM has a low peak to average power ratio (PAPR)
- (A) (i), (ii) and (iii) only (B) (i), (ii) and (iv) only  
 (C) (i) and (iii) only (D) (i), (iii) and (iv) only  
 (E) Answer not known
67. The multiplexing used in MIMO system is
- (A) FDM (B) TDM  
 (C) CDM (D) SDM  
 (E) Answer not known
68. MIMO achieves space measurements to improve wireless systems
- (A) Capacity, Gain, Throughput  
 (B) Capacity, Range, Reliability  
 (C) Reliability, Gain, Range  
 (D) Capacity, Amplitude, Frequency  
 (E) Answer not known

69. Assume four branch diversity is used, where each branch receives an independent Rayleigh fading signal. If the average SNR is 20 dB determine the probability that the SNR will drop below 10 dB.
- (A)  $(1 - e^{0.1})^4$  (B)  $(1 - e^{-0.5})^4$   
 (C)  $(1 - e^{0.5})^4$  (D)  $(1 - e^{-0.1})^4$   
 (E) Answer not known
70. Consider GSM which is a TDMA/FDD function that uses 25 MHz for the forward link which is broken into radio channels of 200 kHz. If 8 speech channels are supported on a single radio channel and if no guard band is assumed, the number of simultaneous users that can be accommodated in GSM is
- (A) 1000 (B) 2000  
 (C) 4000 (D) 8000  
 (E) Answer not known
71. Snell's law states that
- (A)  $n_2 \sin \theta_1 = n_1 \sin \theta_2$  (B)  $n_1 \sin \theta_1 = n_2 \sin \theta_2$   
 (C)  $n_1 n_2 \sin \theta_1 = \sin \theta_2$  (D)  $\sin \theta_1 = n_1 n_2 \sin \theta_2$   
 (E) Answer not known
72. Multipath propagation creates the following important effects are
- (A) Rapid change in signal strength, random frequency variation and time dispersion  
 (B) Interference, fading and refraction  
 (C) Slow fading, fast fading and frequency selective fading  
 (D) AC interference, CC interference and is interference  
 (E) Answer not known



73. Frequency selective fading is due to time dispersion of the transmitted symbols within the channel. Thus the channel induces
- (A) Adjacent channel interference
  - (B) Cochannel interference
  - (C) Inter symbol interference
  - (D) Mutual interference
  - (E) Answer not known
74. The envelope of the received signal, in a short scale fading environment is statistically described by \_\_\_\_\_ distribution, if there is a presence of dominant line – of – sight component.
- (A) Normal
  - (B) Rayleigh
  - (C) Ricean
  - (D) Exponential
  - (E) Answer not known
75. The process of transferring a mobile station from one channel or base station to another is called
- (A) Transfer
  - (B) Give away
  - (C) Disperse
  - (D) Handoff
  - (E) Answer not known
76. A vehicle (mobile terminal) is travelling at a speed of 20 m/s away from a base station BS. The frequency of operation is 800 MHz. Assuming that the mobile terminal is very far from the base station, the doppler shift at the mobile terminal is
- (A) 37 Hz
  - (B) 40 Hz
  - (C) 47 Hz
  - (D) 53 Hz
  - (E) Answer not known

77. If a total of 33 MHz bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses 12 – cell reuse
- (A) 33 channels (B) 65 channels  
 (C) 55 channels (D) 50 channels  
 (E) Answer not known
78. Identify the statement that is true about Handoff strategies.
- (i) A mobile moves into different cell while its idle.  
 (ii) A mobile remains in the same cell and is idle.  
 (iii) A mobile moves into a different cell while in conversation  
 (iv) A mobile moves within same cell while in conversation.
- (A) (i) only (B) (ii) and (iii)  
 (C) (iii) only (D) (iv) only  
 (E) Answer not known
79. Assertion [A] : Communication system with multipath fading channel experiences higher BER compared to ideal channel
- Reason [R] : The additive white Gaussian noise (AWGN) present in the channel leads to bit error
- (A) [A] is true, but [R] is false  
 (B) Both [A] and [R] are true and [R] is the correct explanation of [A]  
 (C) Both [A] and [R] are true and [R] is not the correct explanation of [A]  
 (D) [A] is false, but [R] is true  
 (E) Answer not known

80. Which of the following property is applicable to flat fading
- (1) Bandwidth of signal < Bandwidth of channel
  - (2) Delay spread > Symbol period
  - (3) Delay spread < Symbol period
  - (4) Bandwidth of signal > Bandwidth of channel
- (A) (1) and (2)                                (B) (1) and (3)  
(C) (2) and (4)                                (D) (3) and (4)  
(E) Answer not known
81. The HTTP uses the services of TCP on
- (A) Well-known port 13                        (B) Registered port 80  
(C) Dynamic port 13                         (D) Well-known port 80  
(E) Answer not known
82. \_\_\_\_\_ is the architectural framework for accessing linked documents in the internet.
- (A) FDP    (B) HTTP  
(C) WWW    (D) TELNET  
(E) Answer not known
83. Webpages are viewed with a program called
- (A) Browser                                        (B) Hypertext  
(C) Hyperlinks                                  (D) Software  
(E) Answer not known



88. A pure Aloha network transmits 100 bits frames on a channel of 100 kbps. Calculate the vulnerable time.
- (A) 1 ms (B) 2 ms  
(C) 3 ms (D) 4 ms  
(E) Answer not known
89. Which of the following are the properties of distance vector routing?
- (1) Decrease in cost propagates quickly  
(2) Decrease in cost propagates slowly  
(3) Increase in cost propagates slowly  
(4) Increase in cost propagates quickly
- (A) (1) and (3) (B) (1) and (4)  
(C) (2) and (3) (D) (2) and (4)  
(E) Answer not known
90. The transmission delay is
- (A) Packet length/Transmission rate  
(B) Distance/Transmission rate  
(C) Transmission rate/Distance  
(D) Distance/Propagation speed  
(E) Answer not known



94. Broadcast channels are sometimes referred to as
- (A) Multi access channels
  - (B) Random access channels
  - (C) Broadcast channels are belongs to MAC sublayer
  - (D) Both (A) and (B)
  - (E) Answer not known
95. Which of the following is not a function of data link layer?
- (A) Framing
  - (B) Error control
  - (C) Flow control
  - (D) Channel coding
  - (E) Answer not known
96. A code scheme has a hamming distance  $d_{\min} = 4$ . How many bits of errors are guaranteed to be detected using this code scheme.
- (A) 1
  - (B) 2
  - (C) 3
  - (D) 4
  - (E) Answer not known
97. PPP is a
- (A) Transport layer protocol
  - (B) Application layer protocol
  - (C) Presentation layer protocol
  - (D) Data link layer protocol
  - (E) Answer not known

98. During error control in data link layer sequence numbers allotted to outgoing frames, because

- (A) Receiver distinguish retransmission of frames
- (B) To find missing frames
- (C) To detect error
- (D) To control error
- (E) Answer not known

99. HTTP application protocol belongs to: \_\_\_\_\_ OSI layer.

- (A) Presentation layer
- (B) Session layer
- (C) Transport layer
- (D) Application layer
- (E) Answer not known

100. A causal LTI system is described by the differential equation as,

$$\frac{d^2y(t)}{dt^2} + 3\frac{dy(t)}{dt} + 2y(t) = x(t)$$

It's system function when considering all initial conditions as zero is

- (A)  $H(s) = \frac{3}{2s^2 + 3s + 2}$
- (B)  $H(s) = \frac{3}{s^2 + 2s + 2}$
- (C)  $H(s) = \frac{1}{3s^2 + s + 2}$
- (D)  $H(s) = \frac{1}{s^2 + 3s + 2}$
- (E) Answer not known



101. Convolution of  $x(t + 5)$  with impulse function  $\delta(t - 7)$  is equal to
- (A)  $x(t - 12)$
  - (B)  $x(t + 12)$
  - (C)  $x(t - 2)$
  - (D)  $x(t + 2)$
  - (E) Answer not known
102. Assertion [A] : A causal system with system transfer function  $h(n) = a^n u(n)$  is stable if  $|a| < 1$
- Reason [R] : A system is stable if its pole lies inside the unit circle
- (A) Both [A] & [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
103. For an LTI system with  $x(n) = \{-1, 2, 0, 1\}$ ,  $h(n) = \{3, 1, 0, -1\}$ , find  $y(n)$ .
- (A)  $y(n) = \{3, -5, 4, 2, -1, 0, 1\}$
  - (B)  $y(n) = \{5, 2, 3, 1, 1, 1, 0\}$
  - (C)  $y(n) = \{-3, 5, 2, 4, -1, 0, -1\}$
  - (D)  $y(n) = \{-1, 0, -1, 4, 2, 5, 3\}$
  - (E) Answer not known

104. Let  $x(n) = a^n u(n)$ ,  $|a| < 1$ , and  $X(e^{j\omega})$  be the Fourier Transform of  $x(n)$ . Then  $X(e^{j\omega})$  is

(A)  $\frac{1}{1+a}$

(B)  $1+a$

(C)  $\frac{1}{1-a}$

(D)  $1-a$

(E) Answer not known

105. The  $z$ -Transform of the sequence  $x[n]$  is  $x(z) = \frac{z^2 + 1}{z - 1/3}$ . Determine

the  $z$ -Transform of  $y[n] = \left(\frac{1}{3}\right)^n x[n]$

(A)  $y(z) = \frac{9z^2 + 1}{3z - \frac{1}{3}}$

(B)  $y(z) = \frac{3z^2 + 1}{9z - \frac{1}{3}}$

(C)  $y(z) = (9z^2 + 1) / \left(9z - \frac{1}{3}\right)$

(D)  $y(z) = (3z^2 + 1) / \left(3z - \frac{1}{9}\right)$

(E) Answer not known

106. Which of the following properties of odd and even function of signals – is/are true?

- (i) The product of two even function is also an even function
  - (ii) The product of an even function and an odd function is an odd function
  - (iii) The sum of two odd function is an odd function
- (A) (i) and (ii) only  
(B) (ii) and (iii) only  
(C) (i) only  
(D) (i), (ii) and (iii)  
(E) Answer not known

107. If  $x(n) = b^{|n|}$ ,  $b > 0$ , then the Region of Convergence (ROC) of its  $z$ -transform in  $z$ -plane is

- (A)  $b < |z| < \frac{1}{b}$   
(B)  $\frac{1}{b} < |z| < b$   
(C)  $\frac{1}{b} < |z|$   
(D)  $b < |z|$   
(E) Answer not known

108. 
$$x(t) = \begin{cases} 1 & \text{for } 5 \leq t \leq 10 \\ -1 & \text{for } 10 \leq t \leq 15 \\ 0 & \text{otherwise} \end{cases}$$

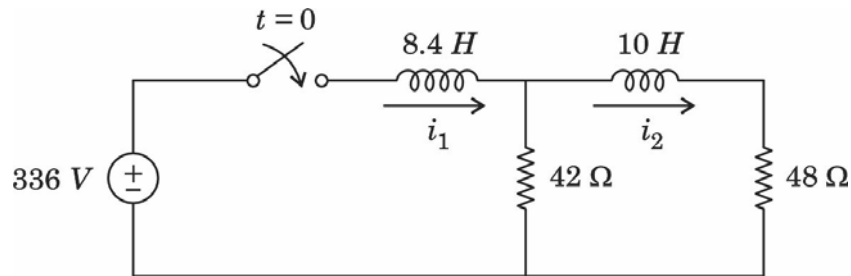
then,  $x(t)$  can be expressed as

- (A)  $u(t+5) - 2u(t+10) + u(t+15)$
- (B)  $u(t-5) - u(t-10) + u(t-15)$
- (C)  $u(t-5) - 2u(t-10) + 2u(t-15)$
- (D)  $u(t-5) - 2u(t-10) + u(t-15)$
- (E) Answer not known

109. Which of the following statements are true about Discrete-Time Fourier series?

- (i) Obeys Even signals and  $a_k$  is real
  - (ii) Doesn't obeys odd signals and  $a_k$  is imaginary
  - (iii) Time shift in time domain leads to phase factor change in frequency domain
- (A) (i) only
  - (B) (ii) and (iii) only
  - (C) (i), (ii) and (iii) only
  - (D) (i) and (iii) only
  - (E) Answer not known

110. The expression for  $i_1$  in the circuit below, when dc voltage is applied at  $t = 0$  is,

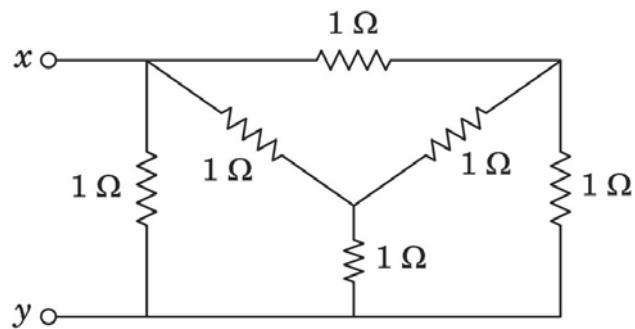


- (A)  $i_1 = (15 - 14e^{-2t} - e^{-12t})A$   
 (B)  $i_1 = (10 - 10e^{-2t} - 5e^{-12t})A$   
 (C)  $i_1 = (15 - 10e^{-2t} - e^{-12t})A$   
 (D)  $i_1 = (10 - 14e^{-2t} - 5e^{-12t})A$   
 (E) Answer not known
111. In the hybrid parameter relation, for passive 2-port network  
 $h_{11}h_{12} - h_{12}h_{21} =$
- (A) 0  
 (B) 1  
 (C) 2  
 (D) -1  
 (E) Answer not known

112. If three equal resistors (value  $R$ ) is connected in delta network, then the value of resistors in the equivalent star network will be

- (A)  $R$
- (B)  $R/3$
- (C)  $3R$
- (D)  $R^3$
- (E) Answer not known

113. Find the equivalent resistance between terminals  $x-y$  in the following network.



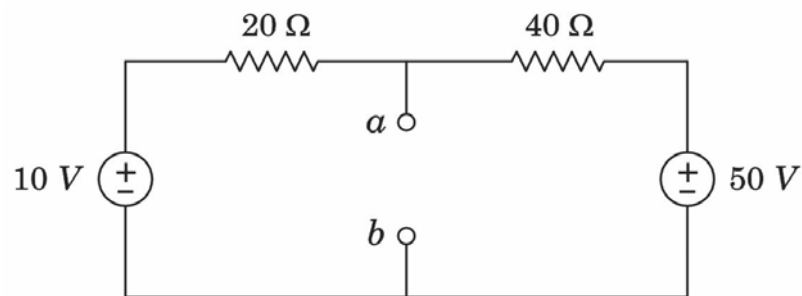
- (A)  $\frac{1}{2}\ \Omega$
- (B)  $\frac{1}{4}\ \Omega$
- (C)  $\frac{1}{6}\ \Omega$
- (D)  $\frac{1}{8}\ \Omega$
- (E) Answer not known

114. Statement A : A circuit containing  $R, L$  &  $C$  is said to be in resonance in the voltage across the circuit is in phase with the current through it.

Statement B : At resonance, the power factor of the circuit is one

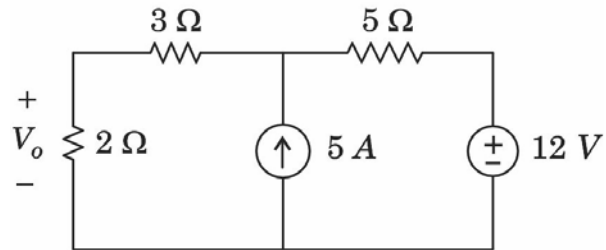
- (A) Both A and B are true
- (B) Both A and B are false
- (C) A is true but B is false
- (D) A is false but B is true
- (E) Answer not known

115. Find the Thevenin voltage and resistance across 'ab' for the network below



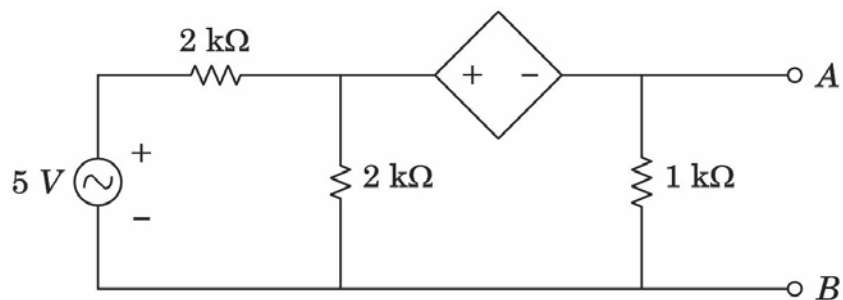
- (A)  $V_{Th} = 23.41 V, R_{Th} = 13.33\Omega$
- (B)  $V_{Th} = 1.75 V, R_{Th} = 13.33\Omega$
- (C)  $V_{Th} = 23.41 V, R_{Th} = 60\Omega$
- (D)  $V_{Th} = 1.75 V, R_{Th} = 60\Omega$
- (E) Answer not known

116. Find  $V_o$  from the circuit.



- (A) 3.7 V
- (B) 7.4 V
- (C) 2.5 V
- (D) 5 V
- (E) Answer not known

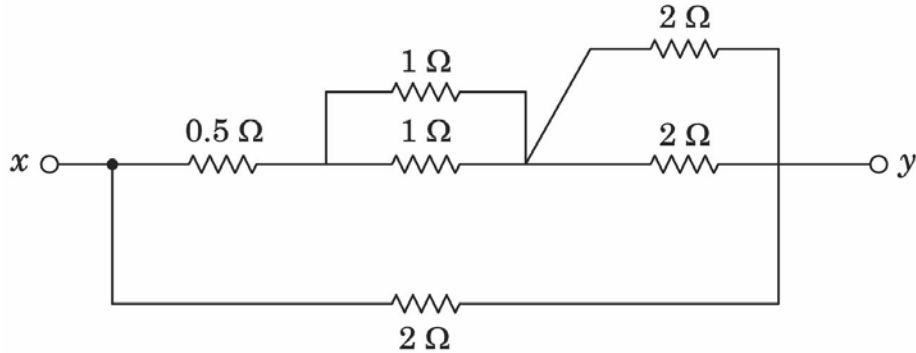
117. Thevenin's resistance across terminals 'A' and 'B' is



- (A) 0.5 kΩ
- (B) 0.2 kΩ
- (C) 1 kΩ
- (D) 0.11 kΩ
- (E) Answer not known

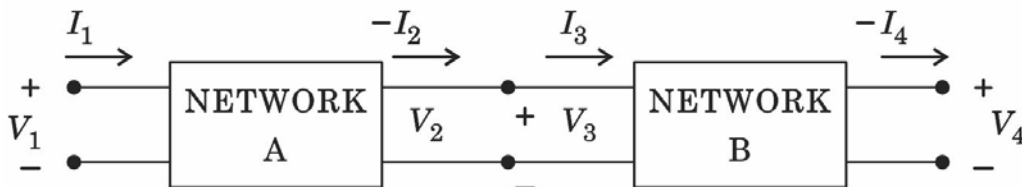


118. Find the equivalent resistance across  $x - y$  of the circuit diagram.



- (A)  $2 \Omega$
- (B)  $1 \Omega$
- (C)  $4 \Omega$
- (D)  $0.5 \Omega$
- (E) Answer not known

119. When two port networks A and B are connected in cascade as shown below, the  $t$  parameter matrix for the connected network is given by



- (A)  $t = t_A + t_B$
- (B)  $t = t_A \cdot t_B$
- (C)  $t = t_A - t_B$
- (D)  $t = t_A / t_B$
- (E) Answer not known

120. Maximum power is transferred to the load when

(A)  $R_S = \frac{R_L}{2}$

(B)  $R_S = R_L$

(C)  $R_S = \sqrt{R_L}$

(D)  $R_S = \frac{R_L}{\sqrt{2}}$

(E) Answer not known

121. A compensator transfer function is given by  $C(S) = \frac{2S+1}{0.2S+1}$ . What is its nature and parameter?

(A) LAG compensator,  $\beta = 10$

(B) LAG compensator,  $\beta = 2$

(C) LEAD compensator,  $\alpha = 0.1$

(D) LEAD compensator,  $\alpha = 0.2$

(E) Answer not known

122. Using Routh's criterion, the number of roots in the right half of S-plane for the characteristic equation  $S^3 + 50S^2 + 5S + 25 = 0$

(A) 0 (B) 1

(C) 2 (D) 3

(E) Answer not known

123. Use the Routh-Hurwitz criterion to determine the stability of the system having characteristic equation

$$S^6 + S^5 + 5S^4 + 3S^3 + 2S^2 - 4S - 8 = 0$$

- (A) Stable
- (B) Unstable
- (C) Partially stable
- (D) Undefined
- (E) Answer not known

124. Which are the characteristics of lead compensation?

- (1) Appreciable improvement in transient response
  - (2) Small change in transient response
  - (3) Appreciable change in steady state accuracy
  - (4) Small change in steady state accuracy
- (A) (1) and (3)
  - (B) (1) and (4)
  - (C) (2) and (3)
  - (D) (2) and (4)
  - (E) Answer not known

125. According to Nyquist criterion, for a system to be stable, all poles should lie
- (A) At the Center of S-plane
  - (B) On Right half of S-plane
  - (C) On Left half of S-plane
  - (D) Both on Right and Left half of S-Plane
  - (E) Answer not known
126. Electrical lag compensator consists of two resistors and a capacitor connected in
- (A) Series
  - (B) Parallel
  - (C) Series parallel
  - (D) Not connected
  - (E) Answer not known
127. State-space methods in control are different from the classical methods because
- (A) they can handle multiple-input multiple output
  - (B) they work in time-domain
  - (C) they are not very in good giving physical insight
  - (D) all of the above
  - (E) Answer not known
128. Gain margin is positive
- (A) marginal stability by increasing open-loop gain
  - (B) marginal stability by decreasing open-loop gain
  - (C) marginal stability achieved without change in gain
  - (D) gain = 0 dB achieved by increasing gain
  - (E) Answer not known

129. Phase crossover frequency ' $\omega_{op}$ ' is the frequency at which the open-loop transfer function has a phase of
- (A)  $180^\circ$
  - (B)  $90^\circ$
  - (C)  $270^\circ$
  - (D)  $0^\circ$
  - (E) Answer not known
130. Given natural frequency  $W_n = 50 \text{ rad/sec}$ , damping factor  $\tau = 0.1$ , find settling time for 2% criterion
- (A) 0.6 seconds
  - (B) 0.8 seconds
  - (C) 0.9 seconds
  - (D) 1 second
  - (E) Answer not known
131. Nyquist criterion mainly depends upon
- (A) Number of encirclements of  $(-1, 0)$
  - (B) Number of encirclements of  $(1, 0)$
  - (C) Number of encirclements of  $(-2, 0)$
  - (D) Number of encirclements of  $(+2, 0)$
  - (E) Answer not known

132. At the phase crossover frequency the phase angle is

- (A)  $\angle G(j\omega) H(j\omega) = -180^\circ$
- (B)  $\angle G(j\omega) H(j\omega) = -90^\circ$
- (C)  $\angle G(j\omega) H(j\omega) = 0^\circ$
- (D)  $\angle G(j\omega) H(j\omega) = -270^\circ$
- (E) Answer not known

133. Difference between bode plots and Nyquist plots is

- (A) Bode plots use magnitude in decibels
- (B) There is no difference
- (C) Nyquist's plots used for applying Nyquist's stability criterion
- (D) Both (A) and (C)
- (E) Answer not known

134. The natural frequency of a closed loop transfer function. Is

$$\frac{C(S)}{R(S)} = \frac{20}{S^2 + (1 + 20K)S + 20}$$

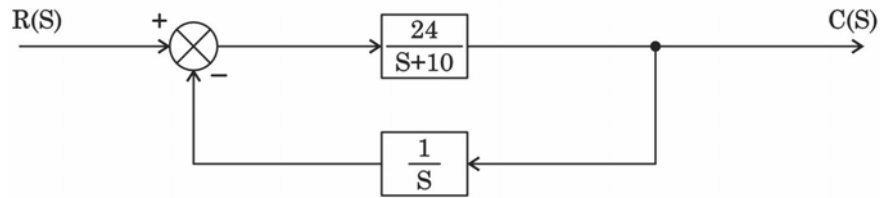
- (A)  $w_n = 20K$
- (B)  $w_n = 400$
- (C)  $w_n = 20$
- (D)  $w_n = \sqrt{20}$
- (E) Answer not known

135. The type and order of a system whose open loop transfer function

given by  $G(S) = \frac{K}{S^3 + 8S^2 + 2S}$  is

- (A) 0, 3
- (B) 0, 2
- (C) 1, 2
- (D) 1, 3
- (E) Answer not known

136. Consider the closed loop control system as shown in figure below.



The closed loop poles of the system are

- (A)  $-4, -10$  (B)  $-4, -6$   
 (C)  $-4, 6$  (D)  $-4, 10$   
 (E) Answer not known

137. The nature of response of a second order critically damped system is

- (A) Oscillatory (B) Damped oscillatory  
 (C) Exponentially rising (D) The larger rise time  
 (E) Answer not known

138. Given the transfer function  $G(S) = \frac{Y(S)}{R(S)} = \frac{1}{S^2 + 3S + 2}$

Find the response  $y(t)$  to the input  $r(t) = 5u(t)$

- (A)  $y(t) = \left[ -5e^{-t} + \frac{5}{2}e^{-2t} \right] u(t)$   
 (B)  $y(t) = \left[ \frac{5}{2} - 5e^{-t} + \frac{5}{2}e^{-2t} \right] u(t)$   
 (C)  $y(t) = \left[ \frac{5}{2} - 5e^{-t} \right] u(t)$   
 (D)  $y(t) = \left[ \frac{5}{2} + \frac{5}{2}e^{-2t} \right] u(t)$   
 (E) Answer not known

139. An impulse is applied at the input of a continuous system and the output is observed to be  $e^{-2t}$ . Find the transfer function.
- (A)  $\frac{1}{s-2}$
  - (B)  $s+2$
  - (C)  $s-2$
  - (D)  $\frac{1}{s+2}$
  - (E) Answer not known
140. In a 2<sup>nd</sup> order feedback control system,
- (A) Natural frequency and damping depends on gain
  - (B) Natural frequency and damping independent of gain
  - (C) Natural frequency and damping dependent on excitation type
  - (D) Natural frequency and damping independent of excitation
  - (E) Answer not known
141. Linear array is said to be uniform array only if its elements are fed with
- (A) Same current and progressive phase shift
  - (B) Same material
  - (C) Emits same polarization
  - (D) Same number of elements
  - (E) Answer not known



142. Write the expression for the radiation resistance  $R_{rad}$  of a Hertzian dipole,

(A)  $R_{rad} = 790 \left( \frac{\lambda}{dl} \right)^2 (\Omega)$

(B)  $R_{rad} = 790 \left( \frac{\lambda}{dl} \right) (\Omega)$

(C)  $R_{rad} = 790 \left( \frac{dl}{\lambda} \right)^2 (\Omega)$

(D)  $R_{rad} = 790 \left( \frac{dl}{\lambda} \right) (\Omega)$

(E) Answer not known

143. END-FIRE linear uniform array, the direction of maximum radiation for  $d_{max} < \frac{\lambda}{2}$  is

(A)  $0^\circ$  and  $180^\circ$

(B)  $90^\circ$  and  $270^\circ$

(C)  $45^\circ$  and  $135^\circ$

(D)  $\pm 135^\circ$

(E) Answer not known

144. A distortionless transmission line operating at 250MHz has  $R = 30 \Omega/m$ ,  $L = 200 nH/m$  and  $C = 80 PF/m$ . The velocity of propagation along the line is

(A)  $25 \times 10^8$  m/sec

(B)  $2.5 \times 10^8$  m/sec

(C)  $1.25 \times 10^8$  m/sec

(D)  $12.5 \times 10^8$  m/sec

(E) Answer not known

145. A transmission line has load impedance  $Z_L = 25 + j50 \Omega$ . Terminating a  $50 \Omega$  line. Find the normalized load impedance.

- (A)  $Z_L = 0.5 + j1 \Omega$                       (B)  $Z_L = 2.5 + j1 \Omega$   
(C)  $Z_L = 1 + j1 \Omega$                       (D)  $Z_L = 25 + j50 \Omega$   
(E) Answer not known

146. Characteristic impedance of a transmission line ' $Z_o$ ' is

- (A)  $Z_o = \sqrt{LC}$                               (B)  $Z_o = \frac{1}{\sqrt{LC}}$   
(C)  $Z_o = \sqrt{\frac{L}{C}}$                               (D)  $Z_o = \frac{L}{C}$   
(E) Answer not known

147. If a lossless line, feeding a complex load impedance, has a VSWR of 4. Then the magnitude of voltage reflection coefficient at load end is

- (A)  $\frac{4}{5}$     (B)  $\frac{5}{3}$   
(C)  $\frac{3}{5}$     (D)  $\frac{5}{4}$   
(E) Answer not known

148. Condition for distortionless line

- (A)  $LC = RG$                                   (B)  $RC = LG$   
(C)  $RL = CG$                                   (D)  $R = LC$   
(E) Answer not known

149. The ratio between amplitudes of reflected and incident electric fields is defined as

- (A) Reflection coefficient                      (B) Transmission coefficient  
(C) Refraction coefficient                    (D) Skin depth  
(E) Answer not known

150. Find the skin depth  $S$  at a frequency of 1 MHz in a medium with  $\sigma = 4 \text{ s/m}$  and  $\mu_r = 1$  &  $\mu_0 = 4\pi \times 10^{-7}$

- (A)  $\frac{1}{4\pi\sqrt{10^{-1}}}$                               (B)  $\frac{1}{4\sqrt{\pi}10^{-1}}$   
(C)  $\frac{4\pi}{\sqrt{10^{-1}}}$                                 (D)  $\frac{16}{\pi\sqrt{10^{-1}}}$   
(E) Answer not known

151. The intrinsic impedance of free space is

- (A)  $\sqrt{\frac{\mu_0}{\epsilon_0}}$                                       (B)  $\sqrt{\frac{\epsilon_0}{\mu_0}}$   
(C)  $\sqrt{\mu_0 \epsilon_0}$                                 (D)  $j\sqrt{\frac{\epsilon_0}{\mu_0}}$   
(E) Answer not known

152. Velocity of plane wave in a medium having  $\mu_r = 2$ ,  $\epsilon_r = 2$  is

- (A)  $V = 1.5 \times 10^8 \text{ m/s}$                       (B)  $V = 15 \times 10^8 \text{ m/s}$   
(C)  $V = 0.15 \times 10^8 \text{ m/s}$                 (D)  $V = 3 \times 10^8 \text{ m/s}$   
(E) Answer not known

153. Let ' $e_v$ ' is the volume charge density, then Poisson's equation is

(A)  $\nabla^2 v = 0$

(B)  $\nabla^2 v = \frac{e_v}{\epsilon}$

(C)  $\nabla^2 v = -\frac{e_v}{\epsilon}$

(D)  $\nabla^2 v = \frac{e_s}{\epsilon}$

(E) Answer not known

154. Divergence of any vector ' $D$ ' is

(A)  $\nabla \cdot D = \lim_{\Delta S \rightarrow 0} \frac{\oint_S D \cdot dS}{\Delta S}$

(B)  $\nabla \cdot D = \lim_{\Delta S \rightarrow 0} \frac{\oint_V D \cdot dV}{\Delta S}$

(C)  $\nabla \cdot D = \lim_{\Delta L \rightarrow 0} \frac{\oint_S D \cdot dS}{\Delta S}$

(D)  $\nabla \cdot D = \lim_{\Delta V \rightarrow 0} \frac{\oint D \cdot dS}{\Delta V}$

(E) Answer not known

155. If charge is distributed with uniform density  $\rho_l \left(\frac{C}{m}\right)$  along an infinite straight line which will be chosen as the  $z$ -axis, then the field  $E$  in cylindrical co-ordinates is given by

(A)  $E = \frac{\rho_l}{2\pi \epsilon_0 r^2} \vec{a}_r$

(B)  $E = \frac{\rho_l}{2\pi \epsilon_0 r} \vec{a}_r$

(C)  $E = \frac{\rho_l}{4\pi \epsilon_0 r} \vec{a}_r$

(D)  $E = \frac{\rho_l}{4\pi \epsilon_0 r^2} \vec{a}_r$

(E) Answer not known

156. The unit of Electric flux density (or) electric displacement is

- (A)  $V / m$  (B)  $C / m^2$   
(C)  $A / m$  (D)  $kg / m$   
(E) Answer not known

157. The intrinsic impedance  $\eta$  (eta) is equal to

- (A) Square of the ratio of permeability to permittivity  
(B) Ratio of permeability to permittivity  
(C) Square root of the ratio of permeability to permittivity  
(D) Square root of the ratio of permittivity to permeability  
(E) Answer not known

158. Differential form of Ampere's circuital law is

- (A)  $\nabla \times E = \frac{-\partial B}{\partial t}$  (B)  $\nabla \times H = J + \frac{\partial D}{\partial t}$   
(C)  $\nabla \cdot D = \rho$  (D)  $\nabla \cdot B = 0$   
(E) Answer not known

159. Gauss's law for magnetic field is  $\oint_S B \cdot dS =$

- (A) 0 (B) 1  
(C) 4 (D) 3  
(E) Answer not known

160. The divergence of  $\vec{D} = e^{-x} \sin y \vec{a}_x - e^{-x} \cos y \vec{a}_y + 2z \vec{a}_z$  at the origin is
- (A)  $2e^{-x} + 2$  (B)  $2e^{-x} - 2$   
 (C) 2 (D)  $-2$   
 (E) Answer not known
161. Contrast stretching is a process that
- (A) expands the range of intensity levels in an image  
 (B) highlights specific range of intensities  
 (C) highlights the contribution made to total image appearance by specific bits  
 (D) enhances flows in the given image  
 (E) Answer not known
162. Among the following video compression standards, which one supports to reduce the spatial redundancy in intraframe predictive coding (in I-frames)
- (A) H.262 and MPEG-2  
 (B) H.261  
 (C) H.263  
 (D) H.264 and MPEG-4 AVC  
 (E) Answer not known
163. A digital image is compressed with a compression ratio of 2. Its relative data redundancy is
- (A) 25% (B) 20%  
 (C) 50% (D) 75%  
 (E) Answer not known

164. In run length coding the second byte value '1' is given by
- (A) End of line
  - (B) Move to a new position
  - (C) End of image
  - (D) Specify pixels individually
  - (E) Answer not known
165. Histogram equalization refers to image
- (A) Quantization
  - (B) Framing
  - (C) Normalization
  - (D) Sampling
  - (E) Answer not known
166. What is the sum of all components of a normalised histogram of a gray scale image?
- (A) 0
  - (B) -1
  - (C) 256
  - (D) 1
  - (E) Answer not known
167. If  $N$  is unquantized number and  $N_r$  is the number quantized by rounding, then rounding error is defined as
- (A)  $N_r - N$
  - (B)  $N - N_r$
  - (C)  $(N_r - N)/2$
  - (D)  $(N_r + N)/2$
  - (E) Answer not known

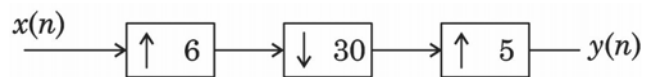
168. Which among the following (IIR) filter realization structure have desirable coefficient sensitivity property

- (A) Ladder (B) Cascade  
 (C) Direct form - I (D) Direct form - II  
 (E) Answer not known

169. Consider a signal  $x(n) = \{1, 3, 2, 5, -1, -2, 2, 3, 2, 1, \dots\}$ . If we upsample the signal by 2-fold and then down sample by 3 fold, the resultant output is

- (A)  $y(n) = \{1, 0, 5, 0, 2, 0, 1, \dots\}$   
 (B)  $y(n) = \{1, 0, 3, 0, 2, 0, 5, 0, -1, \dots\}$   
 (C)  $y(n) = \{1, 5, 2, 1, \dots\}$   
 (D)  $y(n) = \{1, 3, 2, 5, -1, -2, 2, \dots\}$   
 (E) Answer not known

170. Obtain the expression for the output  $y(n)$  in terms of  $x(n)$ .



- (A)  $y(n) = x(5n)$  (B)  $y(n) = x\left(\frac{n}{5}\right)$   
 (C)  $y(n) = x(n-5)$  (D)  $y(n) = x(n)$   
 (E) Answer not known



171. The IIR filter design using the impulse invariant method are appropriate for the design of
- (A) low pass filter and band pass filter
  - (B) low pass filter and high pass filter
  - (C) low pass filter and band stop filter
  - (D) High pass filter and band stop filter
  - (E) Answer not known
172. The magnitude response of which filter has maximally flat pass band and stop band.
- (A) Chebyshev filter – Type I
  - (B) Chebyshev filter – Type II
  - (C) Butterworth filter
  - (D) FIR Filter
  - (E) Answer not known
173. Design of FIR digital filter using fourier series method results is
- (A) Aliasing effect
  - (B) Gibbs oscillation
  - (C) Freq warping
  - (D) Limit cycle oscillation
  - (E) Answer not known

174. The bilinear transformation from the s-plane to the z-plane is given by

(A)  $S = \frac{2}{T} \left( \frac{1 - z^{-1}}{1 + z^{-1}} \right)$

(B)  $S = \frac{T}{2} \left( \frac{1 - Z^{-1}}{1 + Z^{-1}} \right)$

(C)  $S = \frac{2}{T} \left( \frac{1 + Z^{-1}}{1 - z^{-1}} \right)$

(D)  $\frac{2}{T} \left( \frac{1 + Z}{1 - Z} \right)$

(E) Answer not known

175. In hamming window, the approximate transition width of the main lobe is

(A)  $\frac{4\pi}{M}$

(B)  $\frac{8\pi}{M}$

(C)  $\frac{6\pi}{M}$

(D)  $\frac{12\pi}{M}$

(E) Answer not known

176. This question consists of two statements. One labelled as 'Statement (I)' and the other as statement (II). Examine these two statements carefully and select the answers to these items using the code given below.

Statement I : FFT is a much faster version of the DFT algorithm.

Statement II : Time complexity of DFT is  $O(N^2)$  and the time complexity of FFT is  $O(N \log N)$  for N point discrete signal.

- (A) Both Statement I (S1) and Statement II (S2) are true and S2 is the correct explanation of 'S1'
  - (B) Both '(S1)' and '(S2)' are true but 'S2' is not the correct explanation of 'S1'
  - (C) 'S1' is true but 'S2' is false
  - (D) 'S1' is false but 'S2' is true
  - (E) Answer not known
177. Consider the following statements related to decimation in time and decimation in frequency algorithm of FFT.

S1 : Input is in bit reversed order and output is in normal order in decimation in time.

S2 : Number of complex addition and multiplications are the same in both algorithm.

S3 : Input is in bit reversed order and output is also in bit reversed order in decimation in frequency. The correct statement is/are:

- (A) Only S1 and S3
- (B) Only S1 and S2
- (C) S1, S2 and S3
- (D) Only S2 and S3
- (E) Answer not known

178. How many complex multiplications are performed in computing the  $N$ -point DFT of a sequence using divide-and-conquer method if  $N = LM$ ?
- (A)  $N(L + M + 2)$                       (B)  $N(L + M - 2)$   
 (C)  $N(L + M - 1)$                       (D)  $N(L + M + 1)$   
 (E) Answer not known
179. For a finite period sequence  $x[n]$  its DFT  $x(k)$  is
- (A) Continuous and periodic  
 (B) Continuous and aperiodic  
 (C) Discrete and periodic  
 (D) Discrete and aperiodic  
 (E) Answer not known
180. Direct computation of DFT is inefficient, primarily because it
- (A) does not exploit the symmetry and periodicity properties of the phase vector  
 (B) exploits the symmetry property of the phase vector  
 (C) exploits the periodicity property of the phase vector  
 (D) exploits the symmetry and periodicity properties of the phase vector  
 (E) Answer not known



184. PAL structure is
- (A) programmable AND array followed by fixed OR array
  - (B) programmable AND array followed by programmable OR array
  - (C) fixed AND array followed by programmable OR array
  - (D) programmable OR array followed by programmable OR array
  - (E) Answer not known
185. In this form of Addressing, the Address field contains the effective address of the operand
- (A) direct addressing
  - (B) immediate addressing
  - (C) indirect addressing
  - (D) register addressing
  - (E) Answer not known
186. A 4 bit Binary up/down counter is in the binary state of 0000. The next state in the down mode is
- (A) 0001
  - (B) 1111
  - (C) 1000
  - (D) 1110
  - (E) Answer not known
187. The characteristic equation of the complement output of a JK flip flop  $\bar{Q}(t+1) =$
- (A)  $JQ + K'Q^{-1}$  (or)  $JQ + \bar{K}\bar{Q}$
  - (B)  $JQ' + K'Q$  (or)  $J\bar{Q} + \bar{K}Q$
  - (C)  $J'Q' + KQ$  (or)  $\bar{J}\bar{Q} + KQ$
  - (D)  $J'Q + K'Q$  (or)  $\bar{J}Q + \bar{K}Q$
  - (E) Answer not known

188. \_\_\_\_\_ is a complementing flipflop that can be obtained from a JK flipflop when inputs  $J$  and  $K$  are tied together.
- (A) T-Flipflop (B) D-Flipflop  
(C) RS-Flipflop (D) RS-Latch  
(E) Answer not known
189. Which of the following statement is correct?
- (A) PROM contains a fixed and array and a programmable or ARRAY  
(B) PROM has programmable AND and fixed or array  
(C) PLA has fixed and array and programmable or array  
(D) PLA has programmable and array and programmable NOR array  
(E) Answer not known
190. A 10 bit ADC is operating with  $1 \mu$  sec clock period and the total conversion time is seen to be 10 sec. Then the ADC must be the
- (A) counting type  
(B) flash type  
(C) successive approximation type  
(D) integrating type  
(E) Answer not known
191. A feature that distinguishes the J-K flip-flop from the D-flip-flop is the
- (A) toggle state (B) set state  
(C) type of clock (D) reset state  
(E) Answer not known

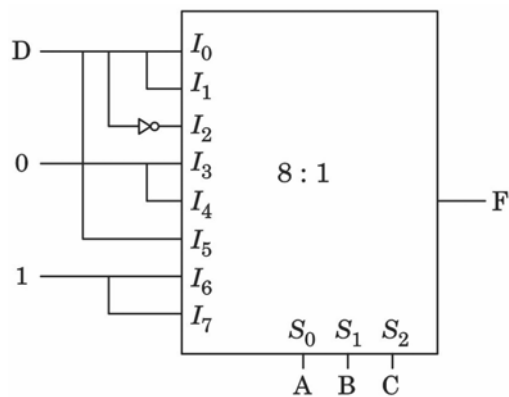
192. The logical expression  $F = (\bar{A} + C)(B + C)(A + B)$  is equivalent to

- (A)  $(\bar{A} + B)(A + C)$                       (B)  $(A + B)(\bar{A} + C)$   
 (C)  $(A + \bar{B})(\bar{A} + C)$                       (D)  $(A + \bar{B})(\bar{A} + \bar{C})$   
 (E) Answer not known

193. The binary numbers given are  $X = 1010100$  and  $Y = 1000011$ , performing  $X - Y$  by using 2's complement produce the output as

- (A) 10010111                      (B) 0010001  
 (C) 0010001                      (D) 10010000  
 (E) Answer not known

194. Find the function 'F' in given multiplexer is, if input D is high.



- (A)  $F = (1, 3, 4, 11, 12, 13, 14, 15)$   
 (B)  $F = 1$   
 (C)  $F = (2, 4, 6, 12, 13, 14)$   
 (D)  $F = (3, 6, 12, 14, 15)$   
 (E) Answer not known



195. The essential prime implicant characterised by
- (i) Prime Implicant
  - (ii) Redundant Implicant
  - (iii) Final expression contains only essential prime Implicants
- (A) (i) is correct
  - (B) (i) and (ii) are correct
  - (C) (i) and (iii) are correct
  - (D) (i), (ii) and (iii) are correct
  - (E) Answer not known

196. The simplified form of the Boolean expression  
 $Y = (\overline{A}BC + D)(\overline{A}D + \overline{B}C)$  can be written as

- (A)  $\overline{A}D + \overline{B}C$
- (B)  $(\overline{A} + D)(\overline{B}C + \overline{D})$
- (C)  $A\overline{D} + B\overline{C}$
- (D)  $AD + \overline{B}C$
- (E) Answer not known

197. Reason and Assertion type:

Assertion [A] : AND-OR logic procedures an output expression in SOP form.

Reason [R] : AND-OR invert logic proceduces a complemented SOP form, which is actually in POS form.

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

198. 2's complement of the binary 1101100 is
- (A) 1101011
  - (B) 0010011
  - (C) 0010100
  - (D) 0010010
  - (E) Answer not known

199. Convert the binary number 0.1011 to decimal
- (A) 0.8675
  - (B) 0.7865
  - (C) 0.6875
  - (D) 0.5678
  - (E) Answer not known

200. The octal value of  $(0.513)_{10}$  is
- (A)  $(0.416517...)_{8}$
  - (B)  $(0.406507...)_{8}$
  - (C)  $(0.406517...)_{8}$
  - (D)  $(0.416507...)_{8}$
  - (E) Answer not known