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ISRO Old questions from 2006 to 2011 in EC/EE streams

Total Questions :480

- 1) In an amplitude modulated system if the total power is 600 W and the power in the carrier is 400 W, the modulation index is ISRO-2011()
- [A] 0.5 [B] 0.75
[C] 0.9 [D] 1
- 2) The channel capacity under the Gaussian noise environment for a discrete memory less channel with a bandwidth of 4 MHz and SNR of 31 is ISRO-2011()
- [A] 20 Mbps [B] 4 Mbps
[C] 8 kbps [D] 4 kbps
- 3) In satellite communication, frequency modulation is used because satellite channel has ISRO-2011()
- [A] High modulation index [B] Small bandwidth and negligible noise
[C] Large bandwidth and service noise [D] Maximum bandwidth and minimum noise
- 4) For a 3- μ m diameter optical fiber with core and cladding indexes of refraction of 1.545 and 1.510, respectively. The cut off wavelength is ISRO-2011()
- [A] 2.3 μ m [B] 1.29 μ m
[C] 1.5 μ m [D] 3.24 μ m
- 5) A 12-bit ADC is operating with a 1 μ s clock period and total conversion time is seen to be 14 μ s always. The ADC must be of the type ISRO-2011()
- [A] Flash type [B] Counting type
[C] Integrating type [D] Successive approximation type
- 6) Consider the analog signal $x(t) = 3\cos 100\pi t$. If the signal is sampled at 200 Hz, the discrete time signal obtained will be ISRO-2011()
- [A] $3\cos(\pi n/4)$ [B] $3\cos(\pi n/2)$
[C] $3\cos(\pi n)$ [D] $3\cos(\pi n/3)$
- 7) In VHDL all the statements written inside a process statement are ISRO-2011()
- [A] Concurrent [B] Sequential
[C] Both of the above [D] None of the above
- 8) A microprocessor with 12-bit address bus will be able to access kilobytes of memory ISRO-2011()
- [A] 0.4 [B] 2
[C] 10 [D] 4
- 9) A practical current source is usually represented by ISRO-2011()
- [A] A resistance in series with an ideal current source [B] A resistance in parallel with an ideal current source
[C] A resistance in parallel with an ideal voltage source [D] None of the above
- 10) The dominant mode in a rectangular wave guide is TE_0 , because this mode has ISRO-2011()
- [A] No attenuation [B] No cut off
[C] No magnetic field component [D] The highest cut-off wavelength
- 11) Assuming ideal conditions, the speed up obtained from a balanced N stage pipeline is ISRO-2008()
- [A] 2N [B] N^2
[C] N [D] N!
- 12) When the antenna diameter is doubled, the gain of the antenna

ISRO-2007()

- [A] reduces by half [B] Increases by 3 dB
[C] Reduces by 3 dB [D] Increases by 6 dB

13) Intrinsic impedance of free space is given as

ISRO-2007()

- [A] 75Ω [B] 73Ω
[C] 377Ω [D] 300Ω

14) A PN junction in series with a 100 ohm resistor is forward biased so that a current of 100 mA flows. If voltage across the combination is instantaneously reversed to 10 V at time $t = 0$, the reverse current that flows through the junction at $t = 0$ is approximately given by

ISRO-2011()

- [A] 0 mA [B] 200 mA
[C] 50 mA [D] 100 mA

15) Ripple factor for a half wave rectifier is

ISRO-2011()

- [A] 1.65 [B] 1.45
[C] 1 [D] 1.21

16) is a primitive that can execute code. It contains an instruction pointer (= program counter) and sometimes has its own stack

ISRO-2011()

- [A] Process [B] Task
[C] Kernel [D] Thread

17) If α and β are the roots of the equation $x^2 - px + q = 0$, then $\Sigma \alpha^2$ is

ISRO-2011()

- [A] $p^2 + 2q$ [B] $p + 2q$
[C] $p^2 - 2q$ [D] $p - 2q$

18) A signal $m_1(t)$ is band limited to 3.6 kHz and three other signals $m_2(t)$, $m_3(t)$ and $m_4(t)$ are band limited to 1.2 kHz each, and these signals are transmitted by means of TDM. Then, what will be the transmission bandwidth of the channel

ISRO-2011()

- [A] 7.2 kHz [B] 14.4 kHz
[C] 3.6 kHz [D] 2.4 kHz

19) For a 10-bit PCM system the signal to quantization noise ratio is 62 dB. If the number of bits is increased by 2, then the signal to quantization noise ratio will

ISRO-2011()

- [A] Increase by 6 dB [B] Increase by 12 dB
[C] Decrease by 6 dB [D] Decrease by 12 dB

20) The modulation normally used with the digital data is

ISRO-2011()

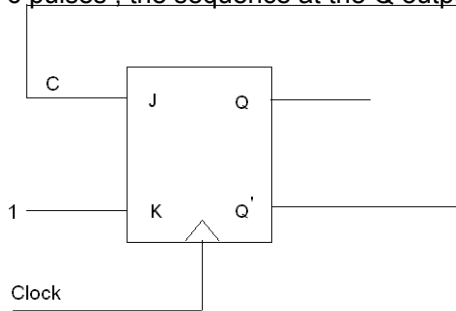
- [A] FM [B] AM
[C] SSB [D] QPSK

21) The critical angle θ_c in an optical fiber is given by Where n_1 is refractive index of medium 1 and n_2 is the refractive index of medium 2

ISRO-2011()

- [A] $\sin^{-1}(n_2/n_1)$ [B] $\sin^{-1}(n_1/n_2)$
[C] $\sin^{-1}(n_2 * n_1)$ [D] $\sin^{-1} n_2$

22) In a JK flip-flop we have $J = Q'$ and $K = 1$. Assuming that the flip flop was initially cleared and clocked for 6 pulses, the sequence at the Q output will be



[A] 010000
 [C] 010010

[B] 011001
 [D] 010101

ISRO-2011()

23) Which of the following system is linear

[A] $y(n) = e^{x(n)}$
 [C] $y(n) = x(n^2)$

[B] $y(n) = Ax(n) + B$
 [D] $y(n) = x^2(n)$

ISRO-2011()

24) Which of the following operator cannot be synthesized by VHDL synthesis tools

[A] +
 [C] *

[B] -
 [D] &

ISRO-2011()

25) Which of the following statements with reference to a generic microprocessor is correct ?

[A] Instruction cycle time period is exactly equal to machine cycle time period
 [C] Machine cycle time period is shorter than Instruction cycle time period

[B] Instruction cycle time period is shorter than machine cycle time period
 [D] Instruction cycle time period is exactly half of machine cycle time period

ISRO-2011()

26) An electric iron designed for 110 V AC supply was rated at 500W. It was put across a 220V supply. Assuming that at 110V it supplied 500W output (i.e no losses) at the new voltage it will supply

[A] 2500 W
 [C] 500 W

[B] 250 W
 [D] 2000 W

ISRO-2011()

27) A very lossy, $\lambda/4$ long, 50 ohm transmission line is open circuited at the load end. The input impedance measured at the other end of the line is approximately

[A] 0
 [C] 50 ohm

[B] ∞
 [D] None of the above

ISRO-2011()

28) For the 2N338 transistor, the manufacturer specifies $P_{max} = 100 \text{ mW}$ at 25°C free air temperature and the maximum junction temperature, $T_{j \text{ max}} = 125^\circ$. Its thermal resistance is

[A] 10^0 C/W
 [C] 1000^0 C/W

[B] 100^0 C/W
 [D] $10,000^0 \text{ C/W}$

ISRO-2011()

29) In a Class AB amplifier, the current flows through the active device for

[A] Less than half of the duration of input cycle
 [C] More than half but less than full cycle duration

[B] Half duration of input cycle
 [D] Full duration of input cycle

ISRO-2011()

30) Which of the following is not true regarding a preemptive kernel

[A] If a high priority thread becomes ready to run, low priority thread is preempted

[B] The kernel checks for the high priority ready to run threads when ever called

ISRO-2011()

- [C]The execution thread is never interrupted
[D]There are special demands on communication between threads and handling common resources
- 31)The solution of differential equation $dy/dx = e^{x-y} + x^2e^{-y}$ is
[A] $e^y = e^x + x^3/3 + c$
[B] $e^y - e^x = c$
[C] $x - e^y = c$
[D] $e^y + e^x + x^3/3 + y = 0$
ISRO-2011()
- 32)The intermediate frequency of a super- heterodyne receiver is 450 KHz . If it is turned to 1200 KHz , the image frequency will be
[A] 750 KHz
[B] 900 KHz
[C] 1600 KHz
[D] 2100 KHz
ISRO-2011()
- 33)The band width of a 'N' bit binary coded PCM signal for modulating a signal having bandwidth of 'f' Hz is
[A] f/N Hz
[B] f
[C] Nf
[D] N
ISRO-2011()
- 34)Go-stationary satellites are placed in equatorial orbits at the height approximately
[A] 1000 km
[B] 15000 km
[C] 25000 km
[D] 36000 km
ISRO-2011()
- 35)For a single mode optical cable with 0.25 dB/km loss , the optical power 100 km from a 0.1 mW source will be
[A] - 30 dBm
[B] - 35 dBm
[C] - 40 dBm
[D] - 45 dBm
ISRO-2011()
- 36)The function of a strobe function in digital system is
[A] To reset memory register
[B] To check the functioning of a logic gate
[C] To avoid race problem
[D] To tri-state the output of the register
ISRO-2011()
- 37)For a class B amplifier providing a 20V peak signal to 16 ohm load and a power supply of $V_{cc} = 30 V$, the efficiency will be
[A] 52.3 %
[B] 25.65 %
[C] 75 %
[D] 78.6 %
ISRO-2011()
- 38)When a microprocessor interfaces with a peripheral or memory device , the normal timing of the microprocessor may need to be altered by introducing
[A] Latching
[B] Wait states
[C] Tristate logics
[D] None of the above
ISRO-2011()
- 39) $\int_0^{\pi/2} (\cos^3 x) dx =$
[A] 3/2
[B] 2/3
[C] 8/9
[D] 8/13
ISRO-2011()
- 40)In phase modulated signal , the frequency deviation is proportional to
[A] Frequency only
[B] Amplitude only
[C] Both of the above
[D] None of the above
ISRO-2011()
- 41)For a fast communication which of the following requirements have to be met
[A] Large bandwidth
[B] High S/N ratio
[C] High channel capacity
[D] None of the above
ISRO-2011()

- 42)The impulse response of a linear time invariant system is $h(n) = \{ 1, 2, 1, -1 \}$. The response for the input signal $x(n) = \{ 1, 2, 3, 1 \}$ is ISRO-2011()
- [A]{1, 8, 4, 8, 3, -1, -2} [B]{ 1, 4, 8, 3, 8, -2, -2}
[C]{ 1, 4, 8, 8, 3, -2, -1} [D]{1, 8, 3, 8, 8, 4, -1}
- 43)Which of the following statement regarding a constant is not true ISRO-2011()
- [A] Constant defined in a package can be referenced by any entity or architecture for which package is used [B] The value of constant can be changed with in the design description
[C] Constant defined in an architecture is visible only to that architecture [D] Constant defined in a process declarative region is not visible outside that process
- 44)In a 8085 microprocessor system with memory mapped I/O ISRO-2011()
- [A] I/O devices have 8-bit address [B] I/O devices are accessed using IN and OUT instructions
[C] There can be maximum 256 input and 256 output devices [D] Arithmetic and logic operations can be directly performed with I/O data
- 45)The Thevenin and Norton circuits are ISRO-2011()
- [A] Single frequency equivalent circuits [B] Multi frequency equivalent circuits
[C] Equivalent independent of frequency [D] Band frequency equivalent circuits
- 46)A broadside array operating at 100 cm wavelength consist of 4 half wave dipoles spaced 50 cm apart . Each element carries radio frequency current in the same phase and of magnitude 0.5 A. The radiated power will be if the radiation resistance is 146 ohm ISRO-2011()
- [A] 146 W [B] 73 W
[C] 36.5 W [D] 18.25 W
- 47)An NPN transistor has a beta cut off frequency f_{β} of 1 MHz , and a common emitter short circuit low frequency current gain β_0 of 200 . its unity gain frequency f_{T} and the alpha cut-off frequency f_{α} respectively are ISRO-2011()
- [A] 200 MHz, 201 MHz [B] 200 MHz , 199 MHz
[C] 199 MHz, 200 MHz [D] 201 MHz , 200 MHz
- 48)For an earth station transmitter input power of 40 dBW (10,000W), with a back off loss of 3 dB, a total branching and feeder loss of 3 dB, and a transmit antenna gain of 40 dB, determine the EIRP ISRO-2011()
- [A] 40 dBW [B] 74 dBW
[C] 34 dBW [D] 80 dBW
- 49)..... is used to describe the light gathering or light collecting ability of an optical fiber ISRO-2011()
- [A] Critical angle [B] Cut-off wavelength
[C] Numerical Aperture [D] Acceptance angle
- 50)..... has the maximum fan out capacity ISRO-2011()
- [A] MOS [B] CMOS
[C] ECL [D] RTL
- 51)If Z-transform of $x(n)$ is $X(z)$ then the Z-transform of $x(n - k)$ is ISRO-2011()
- [A] $X(z^{-k} z)$ [B] $X(z^k z)$
[C] $z^{-k} X(z)$ [D] $z^k X(z)$

52)The following code will implement a

```
process (clk , d) begin
    if (clk = '1' ) then
        q <= d ;
    end if ;
end process
```

ISRO-2011()

- [A] Positive edge triggered D- flip-flop [B] Negative edge triggered D-flip flop
 [C] A latch [D] None of the above

53)The greatest negative number which can be stored in a 8-bit register using 2's complement arithmetic is

ISRO-2011()

- [A]- 256 [B]- 255
 [C]- 127 [D]- 128

54)Two coupled coils have self inductances $L_1 = 10 \text{ mH}$ and $L_2 = 20 \text{ mH}$. The coefficient of coupling (K) being 0.75 in the air . Voltage in the second coil when current in circuit is given by $I = 2 \sin (314t)$ A is

ISRO-2011()

- [A] 3.14 cos (314t) V [B] 3.33 sin (314t) V
 [C] 6.66 cos (314t) V [D] 6.28 cos (314t) V

55)In a radar system , if the peak transmitted power is increased by a factor of 16 and the antenna diameter is increased by a factor of 2 , then the maximum range will increase by a factor of

ISRO-2011()

- [A] 16 [B] 8
 [C] 4 [D] $\sqrt{8}$

56)The transconductance g_m of an FET in the saturation region equals

ISRO-2011()

- [A] $\frac{-2I_{DSS}}{V_P} \left[1 - \frac{V_{GS}}{V_P} \right]$ [B] $\frac{-2I_{DSS}}{V_P} \left[1 - \frac{V_{GS}}{V_P} \right]^2$
 [C] $\frac{-2I_{DSS}}{V_P} \left[1 - \frac{V_{GS}}{V_P} \right]^{1/2}$ [D] $\frac{I}{V_P} [I_{DSS} \times I_{DS}]^{1/2}$

57)The transistor amplifier with 85% of efficiency is likely to be

ISRO-2011()

- [A] Class A [B] Class B
 [C] Class AB [D] Class C

58)A run-time stack cannot be used in a round-robin scheduling system because of the nature of scheduling

ISRO-2011()

- [A] LIFO (Last in First out) [B] FIFO (First in First out)
 [C] FILO (First in Last out) [D] None of the above

59)(3 + i) / (5 + 5i) is same as

ISRO-2011()

- [A] (2 - i) / 5 [B] 3 - i
 [C] 5 - 5i [D] (2 + i) / 5

60)The modulation index of an amplitude modulated wave is changed from 0 to 1 . The transmitted power is

ISRO-2011()

- [A] Doubled [B] Halved
 [C] Increased by 50 percent [D] Unchanged

61)In a communication system , each message (1 or 0) is transmitted three times in order to reduce the probability of error . The detection is based on the majority rule at the receiver . If P_e is the probability of bit error , the probability of error for this communication channel will be

ISRO-2011()

- [A] $3P_e^2 - 2P_e^3$ [B] $1 - P_e^2 - P_e^3$
 [C] P_e^3 [D] $P_e^2(1 - P_e)$

- 62) For a satellite transponder with a receiver antenna gain of 12 dB, an LNA gain of 10 dB, and equivalent noise temperature of 26 dBK^{-1} , the G/T_e is ISRO-2011()
- [A] 4 dBK^{-1} [B] -4 dBK^{-1}
[C] 26 dBK^{-1} [D] -26 dBK^{-1}
- 63)..... current is the leakage current that flows through a photo diode with no input used in as light detectors ISRO-2011()
- [A] Leakage [B] Dark
[C] Saturation current [D] Detection
- 64) The figure of merit of a logic family is given by ISRO-2011()
- [A] Gain bandwidth product [B] (Propagation delay time) * (power dissipation)
[C] fanout * (propagation delay time) [D] (noise margin) * (power dissipation)
- 65)..... is defined as the time delay that a signal component of frequency ω undergoes as it passes from the input to output of the system ISRO-2011()
- [A] Phase delay [B] Group delay
[C] Frequency deviation [D] Latency
- 66) Which statement is true regarding a behavior modeling in VHDL ISRO-2011()
- [A] There can be more than one process statement in an architecture which will interact concurrently [B] Behavioral style of architecture can have only concurrent assignment statements
[C] process is not a single concurrent system [D] A process need not have sensitivity list for proper implementation
- 67) The process of imitating one system with another so that the imitating systems accepts the same date , executes same programs and achieves same results as the imitated system is known as ISRO-2011()
- [A] Simulation [B] Modification
[C] Translation [D] Emulation
- 68) The quality factor of series R-L-C circuit will increase if ISRO-2007()
- [A] R decreases [B] R increases
[C] Voltage increases [D] Voltage decreases
- 69) The values of R, L and C in series RLC circuit that resonates at 1.5 KHz and consumes 50W from a 50 V ac source operating at the resonant frequency . The bandwidth is 0.75 KHz ISRO-2011()
- [A] $R = 50 \text{ ohm}$, $L = 10.6 \text{ mH}$, $C = 1.06 \mu\text{F}$ [B] $R = 500 \text{ ohm}$, $L = 10.6 \text{ mH}$, $C = 10.6 \mu\text{F}$
[C] $R = 50 \text{ ohm}$, $L = 1.06 \text{ mH}$, $C = 10.6 \mu\text{F}$ [D] $R = 500 \text{ ohm}$, $L = 1.06 \text{ mH}$, $C = 1.06 \mu\text{F}$
- 70) When VSWR is 3 , the magnitude of the reflection co-efficient will be ISRO-2011()
- [A] 1/4 [B] 1/3
[C] 1/2 [D] 1
- 71) The conductivity of the intrinsic germanium at 300^0 K is When , n_i at $300^0 \text{ K} = 2.5 \times 10^{13} / \text{cm}^3$ and μ_n and μ_p in germanium are 3800 and 1800 cm^2/Vs respectively ISRO-2011()
- [A] 0.224 S/cm [B] 0.0224 S/cm
[C] 2.24 S/cm [D] 0.00224 S/cm
- 72) As compared to a full wave rectifier using 2 diodes , the four diode bridge rectifier has the dominant advantage of ISRO-2011()
- [A] Higher current carrying [B] Lower peak inverse requirement
[C] Lower ripple factor [D] Higher efficiency

73) In a real time system, the simplest scheme that allows the operating system to allocate memory to two processes simultaneously is

- [A] Over lays [B] Pipeline
 [C] Swapping [D] None of the above

ISRO-2011()

74) $(\cos 5\theta - i \sin 5\theta)^2$ is same as

- [A] $\cos 10\theta + i \sin 10\theta$ [B] $\cos 25\theta - i \sin 25\theta$
 [C] $(\cos \theta + i \sin \theta)^{-10}$ [D] $(\cos \theta - i \sin \theta)^{-10}$

ISRO-2011()

75) In case of which of the following, an increase on the modulation index leads to increase in bandwidth

- [A] PM [B] FM
 [C] AM [D] Both PM and FM

ISRO-2011()

76) Four voice signals, each limited to 4 kHz and sampled at Nyquist rate, are converted into binary PCM signal using 256 quantisation levels. The bit transmission rate for the time division multiplexing signal will be

- [A] 8 kbps [B] 64 kbps
 [C] 256 kbps [D] 5126 kbps

ISRO-2011()

77) If a counter having 10 FFs is initially at 0, what count will it hold after 2060 pulses?

- [A] 000 000 1100 [B] 000 001 1100
 [C] 000 001 1000 [D] 000 000 1110

ISRO-2011()

78) The output of a circular convolution performed on two signals

$$x_1(n) = \{2, 1, 2, 1\} \text{ and } x_2(n) = \{1, 2, 3, 4\}$$

- [A] { 16, 14, 16, 14 } [B] { 14, 16, 14, 16 }
 [C] { 12, 14, 12, 14 } [D] { 14, 12, 14, 12 }

ISRO-2011()

79) When using a sequential code to design a combinational logic in VHDL, if complete truth table is not defined, the synthesis tool will implement a which is not required

- [A] Clock buffer [B] Buffer
 [C] Flip flop [D] Latch

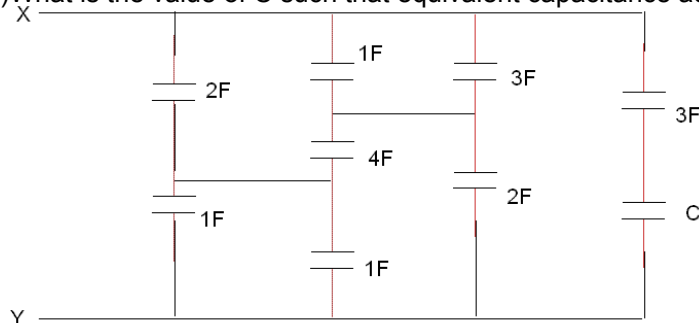
ISRO-2011()

80) In what order the elements of a pushdown stack are accessed?

- [A] First In First Out (FIFO) [B] Last In Last Out (LILO)
 [C] Last In First Out (LIFO) [D] None of the above

ISRO-2011()

81) What is the value of C such that equivalent capacitance across X-Y is 5F



- [A] 20 F [B] 23 F
 [C] 22 F [D] 21 F

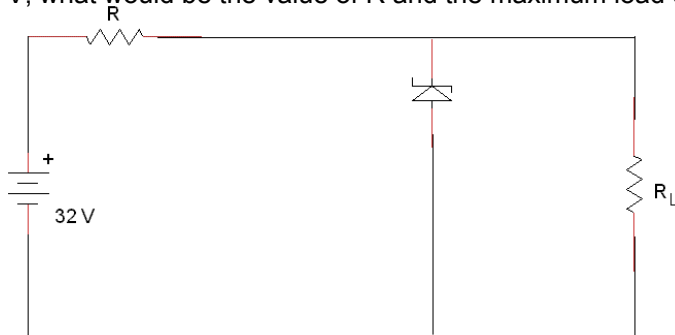
ISRO-2011()

82) A wave guide section in a microwave circuit will act as a

ISRO-2011()

- [A] Low pass filter [B] Band pass filter
 [C] High pass filter [D] Band stop filter

83) A 24 V, 600 mW Zener is to be used for providing a 24 V stabilized supply to a variable load . Assume that for proper Zener action , a minimum of 10 mA must flow through the Zener . If the input voltage is 32 V, what would be the value of R and the maximum load current ?



- [A] 320 ohm , 10 mA [B] 400 ohm, 15 mA
 [C] 400 ohm , 10 mA [D] 320 ohm , 15 mA

ISRO-2011()

84) The value of x at which y has a minimum for $y = x^2 - 3x + 1$ is

- [A] - 3/2 [B] 3/2
 [C] 0 [D] None of these

ISRO-2011()

85) An LTI system has the input signal $x(n)$. Which of the following sequence of operations is most appropriate to get output $y(n) = x(n - M/L)$.

- [A] Interpolation by L , Delay by M , Decimation by M [B] Delay by M , Interpolation by L , Decimation by M
 [C] Decimation by L , Delay by M , Interpolation by L [D] Interpolation by L , Decimation by L , delay by M

ISRO-2010()

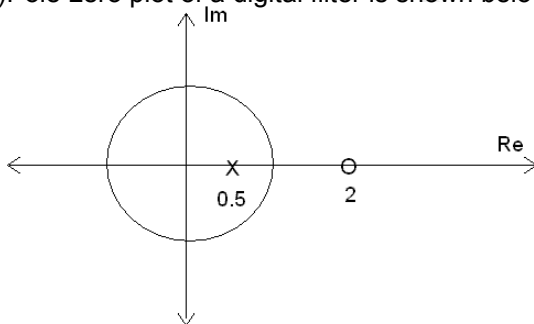
86) Consider a low pass random process with a white noise power spectral density
 $S_x(\omega) = N/2$ where $-2\pi B \leq \omega \leq 2\pi B$
 0 elsewhere

The Auto-correlation function $R_x(\tau)$ is

- [A] $2NB \text{sinc}(2\pi B\tau)$ [B] $\pi NB \text{sinc}(2\pi B\tau)$
 [C] $NB \text{sinc}(2\pi B\tau)$ [D] None of the above

ISRO-2010()

87) Pole-zero plot of a digital filter is shown below , what is the type of filter ?



- [A] Low Pass [B] High Pass
 [C] Band Stop [D] All Pass

ISRO-2010()

88) Determine the DTFT of the sequence $y[n] = (n + 1)\alpha^n u[n]$, $|\alpha| < 1$. $u[n]$ is unit step sequence .

- [A] $Y(e^{j\omega}) = 1/(1 - \alpha e^{-j\omega})^2$ [B] $Y(e^{j\omega}) = 1/(1 + \alpha e^{-j\omega})^2$
 [C] $Y(e^{j\omega}) = \alpha/(1 - \alpha e^{-j\omega})^2$ [D] None of the above

ISRO-2010()

89) The function $f(t)$ has the Fourier transform $g(\omega)$. The Fourier transform of $g(t)$ is

ISRO-2010()

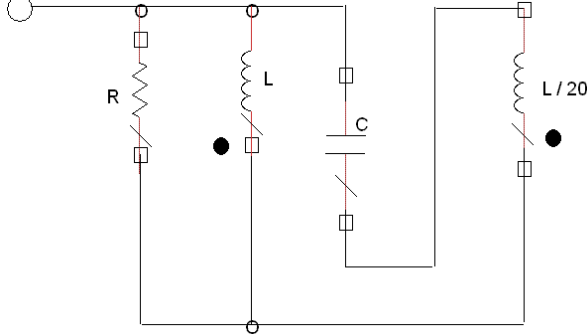
- [A] $f(\omega)/2\pi$ [B] $f(-\omega)/2\pi$
 [C] $2\pi f(-\omega)$ [D] None of the above

90)The purpose of Design For Test (DFT) process in ASIC design flow is

ISRO-2010()

- [A] To capture functional errors [B] To capture manufacturing defects
 [C] To capture timing violations [D] For radiation mitigation

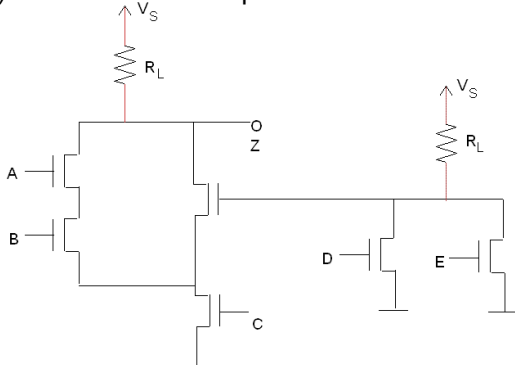
91)The coupling between the two inductors is increased from zero in the circuit shown . Which of the following statements is true ?



ISRO-2010()

- [A] The resonant frequency will increase and the Q will decrease [B] The resonant frequency and Q will both increase
 [C] The resonant frequency and Q will both decrease [D] The resonant frequency will decrease and Q will increase

92)Write a Boolean expression for Z in terms of A, B, C, D and E . You need not simplify the expression



ISRO-2010()

- [A] $\overline{\{(A+B).(D.E)\} + C}$ [B] $\overline{\{(A.B).(D+E)\} . C}$
 [C] $\overline{\{(A.B) + (D+E)\} . \bar{C}}$ [D] False

93)A parallel plate capacitor of 100 pf having an air dielectric is charged to 10 kilovolts . It is then electrically isolated . The plates are pulled away from each other until the distance is ten times more than before . Estimate the energy needed to pull the plates

ISRO-2010()

- [A] 0.05 Joules [B] 50 Joules
 [C] 500 Joules [D] - 50 Joules

94)How could Schroedinger's equation be relevant in the practical design of a Cathode Ray Tube ?

ISRO-2010()

- [A] To optimize the colour quality [B] To optimize the picture sharpness
 [C] It is not relevant , because the CRT contains no crystalline lattice structure [D] Its effects are negligible , as the electron wavelength is very small compared to the spot size

95)When compared with stripline , the major disadvantage of microstrip line is

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- [A] Not amenable for printed circuit technique [B] More expensive and complex to manufacture
 [C] Bulkier and voluminous [D] More likely to radiate

96) The disadvantage of single-stub matching as compared to double-stub matching, is that

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- [A] The stub position has to be adjustable [B] Only shunt stub can be used
 [C] Only resistive load can be matched [D] Useful only in two wire transmission line

97) A charge $Q_2 = 8.854 \times 10^{-9} \text{ C}$ is located in a vacuum at $P_2(2, 3, 1)$. The force on Q_2 due to a charge $Q_1 = 4\pi \times 10^{-3} \text{ C}$ at $P_1(2, 2, 1)$ is

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- [A] $a_y \text{ N}$ [B] $-5.4a_x + 6.3a_y - 5.4a_z \text{ N}$
 [C] $5.4a_x - 6.3a_y - 5.4a_z \text{ N}$ [D] None

98) If a material contains $10^{20} \text{ molecules/m}^3$, each molecule having a moment of $8.854 \times 10^{-27} \text{ C-m}$ parallel to an electric field of 10^5 V/m , then its dielectric constant is

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- [A] 2.2 [B] 2
 [C] 4 [D] 12

99) If every minor of order 'r' of a matrix 'A' is zero, then rank of 'A' is

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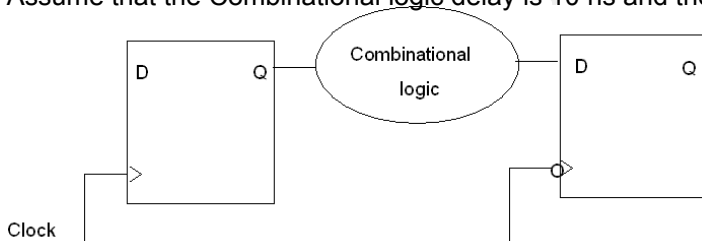
- [A] greater than 'r' [B] equal to 'r'
 [C] less than or equal to 'r' [D] less than 'r'

100) Which of the following is true

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- [A] The product of the eigen values of a matrix is equal to the trace of the matrix [B] The eigen values of a skew-symmetric matrix are real
 [C] A is a non zero column matrix and B is a non zero row matrix, then rank of AB is one [D] A system of linear non-homogeneous equations is consistent if and only if the rank of the coefficient matrix is less than or equal to the rank of the augmented matrix

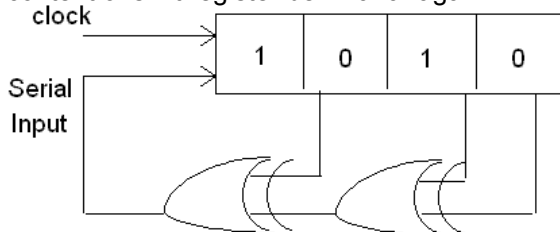
101) What is the maximum clock frequency at which following circuit can be operated without timing violations? Assume that the Combinational logic delay is 10 ns and the clock duty cycle varies from 40% to 60%



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- [A] 100 MHz [B] 50 MHz
 [C] 40 MHz [D] 25 MHz

102) Following shift register is initially loaded with the bit pattern "1010". After how many clock cycles will the content of shift register be "1010" again?



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- [A] 5 [B] 9
 [C] 7 [D] 15

103) Which one of the following is the lowest level of abstraction for representation of a digital system ?

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- [A] VHDL / Verilog [B] GDS-II
[C] Gate level netlist [D] System C

104) The content of the accumulator of 8085 microprocessor after execution of the following instructions will be

MVI A, A7h
ORA A
RLC

ISRO-2010()

- [A] FFh [B] 4Fh
[C] 3Fh [D] CEh

105) For CMOS implementation of 2 input XOR logic gates, how many nMOS and pMOS transistors are required ?

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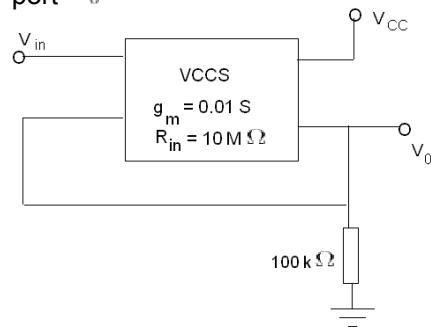
- [A] 2 nMOS and 2 pMOS [B] 3 nMOS and 3 pMOS
[C] 6 nMOS and 6 pMOS [D] 8 nMOS and 8 pMOS

106) Which of the following principles is applied while designing the output matching network for a high power Class-C amplifier ?

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- [A] Maximum Power Transfer Theorem [B] Norton's Theorem
[C] Thevenin's Theorem [D] $Power = (voltage)^2 / R_L$

107) Find the approximate output impedance of the VCCS (voltage controlled current source) based circuit at port V_0



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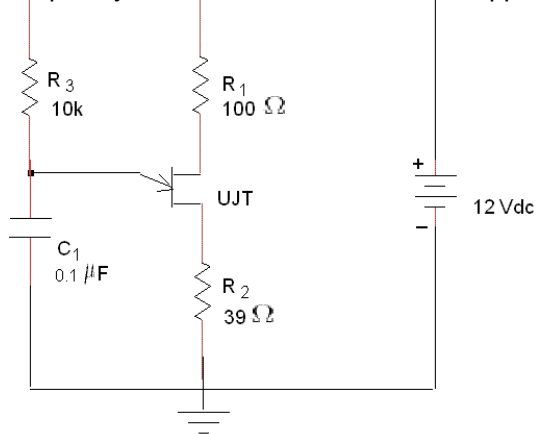
- [A] 0.01Ω [B] 100Ω
[C] $100 \text{ k}\Omega$ [D] $10 \text{ M}\Omega$

108) Which of the following parameters of a Silicon Schottky Diode is higher than that of a corresponding PN junction diode ?

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- [A] Forward voltage drop [B] Reverse recovery current
[C] Reverse recovery time [D] Reverse leakage current

109) Assume the intrinsic standoff ratio for the UJT is 0.8 for the relaxation oscillator circuit given below . The frequency of oscillation of this circuit is approximately equal to

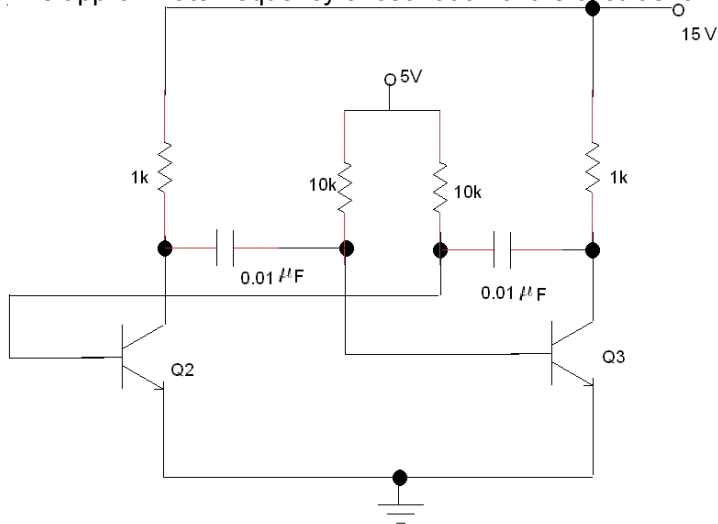


- [A] 1.43 kHz
 [C] 7 kHz

- [B] 620 Hz
 [D] 1.6 kHz

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110) The approximate frequency of oscillation of the circuit shown below is



- [A] 8.3 kHz
 [C] 7.2 kHz

- [B] 16.6 kHz
 [D] 3.6 kHz

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111) A unit step voltage travels from left to right along an infinite transmission line . It hits an inductive discontinuity at $t = 0$. What will be the waveform immediately to the left of the discontinuity ?

- [A] Positive spike on a unit step
 [C] Attenuated unit step

- [B] Unit step with reduced rise time
 [D] Magnified unit step

ISRO-2010()

112) A lossy open stub having a length $1/32$ wavelength , is approximately equivalent to

- [A] A small capacitor in shunt with a small resistor
 [C] A small inductor in shunt with a small resistor

- [B] A small capacitor in shunt with a large resistor
 [D] A large inductor in shunt with a large resistor

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113) Ampere's law relates

- [A] Electric field and Charge
 [C] Magnetic field and current

- [B] Electric field and Current
 [D] Magnetic field and Charge

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114) Across which type of boundary does the electric field have a continuous tangential component ?

- [A] Charge free boundary
 [C] Any boundary

- [B] Current free boundary
 [D] Charged boundary

ISRO-2010()

115) Laplace Transform of $e^{at}t^n$ is

- [A] $n/(s-a)^{n+1}$ [B] $n!/(s+a)^{n+1}$
 [C] $n!/(s-a)^{n+1}$ [D] $1/(s-a)^{n+1}$

ISRO-2010()

116) For $-\infty < x < \infty$, $-1 < y < 1$, the partial differential equation

$$x^2 \frac{\partial^2 u}{\partial x^2} + (1-y^2) \frac{\partial^2 u}{\partial y^2} = 0$$

is

- [A] parabolic [B] Hyperbolic
 [C] Elliptic [D] Nature can not be predicted

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117) A CMOS digital circuit consumes P watts of dynamic power while operating at 20 MHz clock frequency and 5 V supply. What will be its dynamic power consumption if the clock frequency is increased to 40 MHz and supply voltage is decreased to 2.5 V ?

- [A] P/4 [B] P/2
 [C] P [D] 2P

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118) A communication channel with Additive White Gaussian Noise, has a bandwidth of 4 kHz and SNR of 31 dB. Its channel capacity is

- [A] 1.6 kbps [B] 20 kbps
 [C] 32 kbps [D] 256 kbps

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119) If the total power of an amplitude modulated signal is 600W and the carrier power is 400W, the modulation index is

- [A] 0.75 [B] 0.5
 [C] 0.25 [D] 1

ISRO-2010()

120) What is the advantage of Offset QPSK (OQPSK) compared to conventional QPSK ?

- [A] Constant envelope [B] Bandwidth efficiency
 [C] Simple demodulator [D] All of above

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121) An angle modulated signal with carrier frequency $\omega_c = 2\pi \times 10^5$ is described by the equation $s(t) = 10 \cos(\omega_c t + 5 \sin(3000\pi t) + 10 \sin(2000\pi t))$. What is the frequency deviation Δf ?

- [A] 12387.32 Hz [B] 17500 Hz
 [C] 20000 Hz [D] 15000 Hz

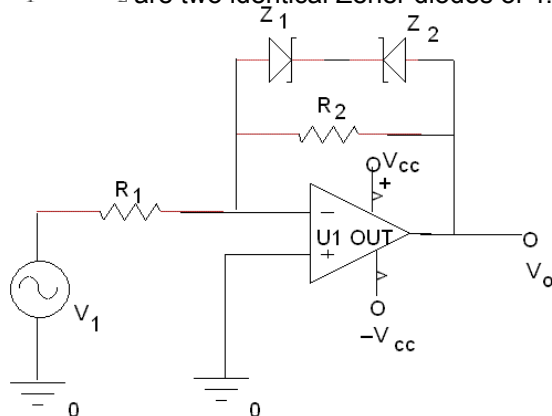
ISRO-2010()

122) The Fourier transform of a signal $x(t) = e^{-4|t|}$ is

- [A] $8/(16 + \omega^2)$ [B] $-8/(16 - \omega^2)$
 [C] $4/(16 + \omega^2)$ [D] $-4/(16 + \omega^2)$

ISRO-2010()

123) What is the output waveform V_o for a sinusoidal input of peak-peak amplitude of 4V. Assume that Z_1 and Z_2 are two identical Zener diodes of 4.7 V, and $R_1 = 10 \text{ k}\Omega$ and $R_2 = 20 \text{ k}\Omega$



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- [A] Same as input
 [B] Sinusoidal waveform with 5.4V peak
 [C] Sinusoidal waveform clamped to +/- 4.7 V
 [D] Sinusoidal waveform clamped to +/- 5.4 V

124) For a particular toroidal inductor core , the inductance value obtained for 50 Turns is $200 \mu H$. If two such inductors are wired in parallel , the resulting inductance is

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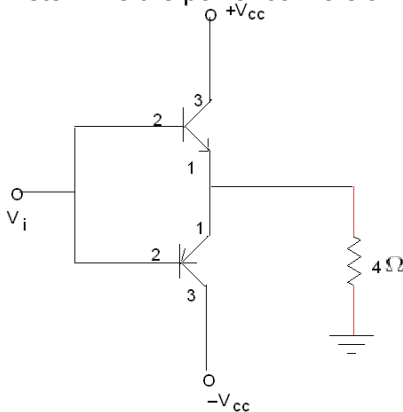
- [A] $200 \mu H$
 [B] $50 \mu H$
 [C] $400 \mu H$
 [D] $100 \mu H$

125) The magnetic equivalent of Ohm's Law is

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- [A] Lenz's Law
 [B] Faraday's Law
 [C] Rowland's Law
 [D] Maxwell's Law

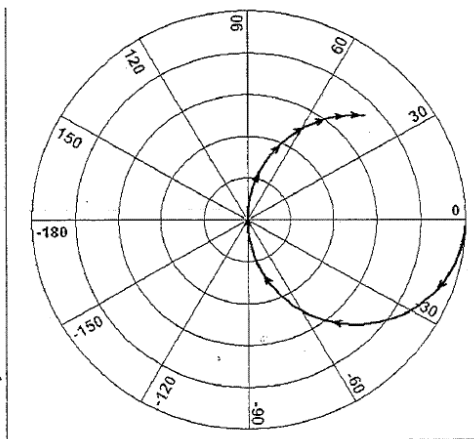
126) It is required to design a class B output stage (as shown below) to deliver an average output power of 12.5 W to a load of 4Ω . The power supply is selected so that V_{cc} is 5 V greater than the peak output voltage . Determine the power conversion efficiency of the circuit .



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- [A] 48%
 [B] 50%
 [C] 52%
 [D] 54%

127) Which type of circuit has an input impedance as shown in this polar plot ?



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- [A] A resistance , capacitor and inductor in series
 [B] A resistance , capacitor and inductor in parallel
 [C] A resistance in shunt with a series combination of an inductor and a capacitor
 [D] A resistance in series with a shunt combination of an inductor and a capacitor

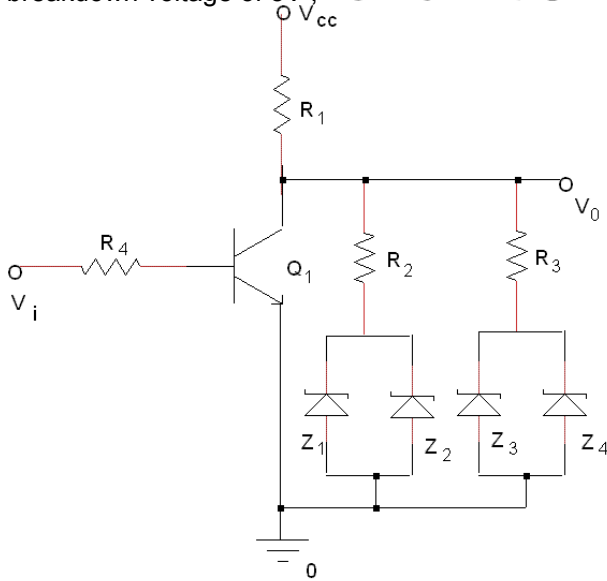
128) A coaxial transmission line carrying an RF signal is perfectly matched to the load . Consider the cross section of the line , at a plane where the instantaneous voltage is at its maximum value . How will the curl of the E-field vary over this cross-section ?

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- [A] Increase from the center to the outer conductor
 [B] Decrease from the center to the outer conductor
 [C] Zero everywhere
 [D] Constant value proportional to the RF voltage

- 129) The continuity of the tangential field component at the interface of two media for normal incidence of a plane wave requires
- [A] $T = 1 - \Gamma$ [B] $T = 1 + \Gamma$
[C] $T = \Gamma$ [D] $T \neq \Gamma$ ISRO-2010()
- 130) Which mode of a circular waveguide will have the lowest attenuation ?
- [A] TE_{11} Mode [B] TE_{01} Mode
[C] TE_{21} Mode [D] TE_{01} Mode ISRO-2010()
- 131) If $\varphi = 2x^2y - xz^3$, then the Laplacian of φ is
- [A] $4yz - 6xz$ [B] $4z - 6xy$
[C] $4y - 6xz$ [D] $2xy - 6yz$ ISRO-2010()
- 132) What does the following integral evaluate to ?
- $$\int_0^{\pi/2} \sin^6 \theta d\theta$$
- [A] $5\pi/16$ [B] $5\pi/8$
[C] 0 [D] $5\pi/32$ ISRO-2010()
- 133) A signal with two frequency components at 6 KHz and 12 KHz, is sampled at the rate of 16 kHz and then passed through a Low Pass filter having a cut-off frequency of 16 kHz. The output signal of the filter
- [A] is an undistorted version of the original value [B] contains the 6 kHz component and a spurious component of 4 kHz
[C] contains only the 6 kHz components [D] contains both the components of the original signal and two spurious components of 4 kHz and 6 kHz ISRO-2010()
- 134) What is the greatest allowable PRF for unambiguous reception in a radar having a maximum range of 120 km ?
- [A] 1250 pps [B] 2500 pps
[C] 1200 pps [D] 5000 pps ISRO-2010()
- 135) A microprocessor has a cache memory with access time of 2 ns and a main memory with access time of 10 ns. If the cache miss ratio is 0.6, what is the average memory access time ?
- [A] 6.8 ns [B] 6 ns
[C] 5.2 ns [D] 12 ns ISRO-2010()
- 136) Consider the following assembly code for a hypothetical RISC processor with a 4-stage pipeline (Instruction Fetch, Decode/Register Read, Execute and write).
- ```
add r1, r2, r3 // r1 = r2 + r3
sub r4, r1, r3 // r4 = r1 + r3
mul r5, r2, r3 // r5 = r2 * r3
```
- Identify the possible pipeline hazard and the affected instruction
- [A] Read after write hazard during mul [B] Read after write hazard during sub  
[C] Read after write hazard during add [D] Write after write hazard during mul ISRO-2010( )
- 137) A zero memory source emits six messages with probabilities 0.3, 0.25, 0.15, 0.12, 0.1 and 0.08. If binary Huffman coding is used, what will be the average code length ?
- [A] 2.45 bits [B] 3.45 bits  
[C] 2.54 bits [D] 3.54 bits ISRO-2010( )

138) In the circuit given below, assume that  $V_{cc} = 15\text{ V}$ ;  $Z_1, Z_2, Z_3, Z_4$  are identical zener diodes with breakdown voltage of  $5\text{ V}$ ;  $R_1 = R_4 = 5\text{ k}\Omega$ ,  $R_2 = R_3 = 10\text{ k}\Omega$ . Find  $V_0$  when  $Q_1$  is OFF

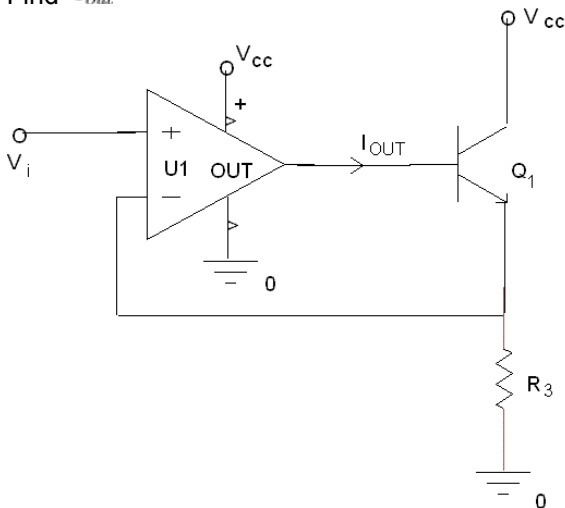


- [A] 7.5 V  
 [C] 10 V

- [B] 5 V  
 [D] 8.33 V

ISRO-2010( )

139) Assume that  $V_i = 2\text{ V}$ ;  $R_3 = 10\Omega$ ;  $\beta$  of  $Q_1 = 50$ ;  $V_{cc} = 15\text{ V}$   
 Find  $I_{out}$



- [A] 3.92 mA  
 [C] 6.84 mA

- [B] 4 mA  
 [D] 2.8 mA

ISRO-2010( )

140) A sample and hold amplifier is connected to an ADC. The acquisition time of the sample and hold amplifier is  $10\ \mu\text{sec}$  and the conversion time of the ADC is  $15\ \mu\text{sec}$ . What is the highest possible data rate?

- [A] 100 ksamples  
 [C] 40 ksamples

- [B] 400 ksamples  
 [D] 66 ksamples

ISRO-2010( )

141) In an inverting OP-AMP, the input bias current is  $-1\ \mu\text{A}$ , and the input and the feedback resistances are both  $1\ \text{M}\Omega$ . What will be the output voltage for an input voltage of  $2.5\ \text{V}$ ?

- [A] - 2.5 V  
 [C] - 3.5 V

- [B] - 3.0 V  
 [D] 4.0 V

ISRO-2010( )

142) Which of the following devices can be used for generating a PWM signal?

ISRO-2010( )

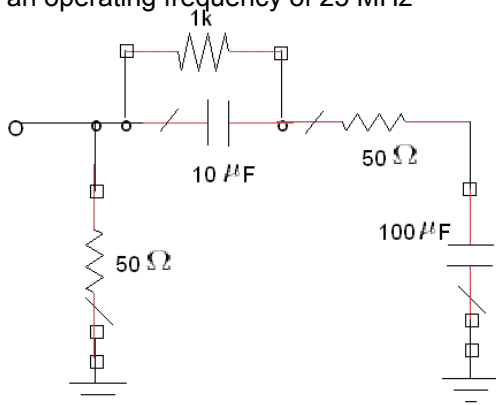
- [A] Comparator [B] 555 timer  
 [C] Counter and magnitude comparator [D] All the above

143) A microwave receiving antenna on a satellite is pointing towards the earth . The antenna beamwidth is 50 degrees . The earth subtends 5 degrees at the satellite . What will be the noise temperature of the antenna ?

ISRO-2010( )

- [A] 30 degrees Kelvin [B] 5 degrees Kelvin  
 [C] 300 degrees Kelvin [D] 1000 degrees Kelvin

144) Estimate the magnitude and phase of the element  $S_{11}$  of the S-matrix of the circuit shown below . Assume an operating frequency of 25 MHz



ISRO-2010( )

- [A]  $25 \angle 180^\circ$  [B]  $25 \angle 0^\circ$   
 [C]  $0.33 \angle 180^\circ$  [D]  $0.33 \angle 0^\circ$

145) The electric field measured in the far field of an antenna at a distance of 50m is 1 V/m . The average power density at a distance of 500m from the antenna is

ISRO-2010( )

- [A]  $26.6 \mu W/m^2$  [B]  $0.1 \mu W/m^2$   
 [C]  $10 \mu W/m^2$  [D]  $13.3 \mu W/m^2$

146) A quarter wave monopole antenna is situated above a perfectly conducting ground plane . It is driven by a 50 V source at 500 MHz through an internal impedance of  $63.5 \Omega$ . The average power radiated by the antenna is

ISRO-2010( )

- [A]  $39.3 W/m^2$  [B]  $4.56 W/m^2$   
 [C]  $68.49 W/m^2$  [D]  $45.6 W/m^2$

147) Directional derivative of  $U = 2x^3y - 3y^2z$  at  $P(1, 2, -1)$  in a direction towards  $Q(3, -1, 5)$  is

ISRO-2010( )

- [A]  $-90/7$  [B]  $30/7$   
 [C]  $90/49$  [D] None of the above

148) Consider the equation  $\text{Re}(1/z) = c$ , where  $z$  is a complex number,  $c$  is a nonzero constant and  $\text{Re}(\cdot)$  represents the real part . The equation describes a

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- [A] Straight line [B] Parabola  
 [C] Circle [D] None of the above

149) How many adders are required to realize a 256 point radix-2 FET using

ISRO-2010( )

- [A] 256 [B] 1024  
 [C] 4096 [D] 2048

150) A uniformly distributed random signal  $x[n]$  with mean  $m_x = 2$  and variance  $\sigma_x^2 = 3$ , is passed through a 3-point moving average filter having an impulse response  $\{h[n]\} = \{1/3, 1/3, 1/3\}$ . What will be the mean and variance of output ?

ISRO-2010( )

[A]  $m_y = 2, \sigma_y^2 = 1$   
[C]  $m_y = 1, \sigma_y^2 = 1$

[B]  $m_y = 2, \sigma_y^2 = 3$   
[D]  $m_y = 3, \sigma_y^2 = 3$

151) A sine wave is applied to a balanced modulator . The peak output envelope power is 1000 times the minimum output envelope power . Estimate the carrier suppression in dBc .

ISRO-2010( )

[A] 24 dBc  
[C] 36 dBc

[B] 30 dBc  
[D] 40 dBc

152) Consider a single error correcting (7 , 4) cyclic code with generator matrix  $g(x) = x^3 + x^2 + 1$ . What will be the transmitted data if received vector  $r$  is 1101101 ?

ISRO-2010( )

[A] 1100  
[C] 0001

[B] 1010  
[D] 1110

153) Consider a Golay's (23, 12) code with  $t$  bits of error correction capability . For what value of  $t$  will the code exactly satisfy the Hamming bound ?

ISRO-2010( )

[A] 2  
[C] 4

[B] 3  
[D] 5

154) The maximum range of a monostatic Radar is  $R$  . If a target having a Radar cross section of  $10 \text{ m}^2$  exists at  $R/2$  , what should be the target cross - section at  $3R/2$  to result in an equal signal strength at the Radar ?

ISRO-2010( )

[A]  $90 \text{ m}^2$   
[C]  $810 \text{ m}^2$

[B]  $270 \text{ W/ m}^2$   
[D]  $30 \text{ W/m}^2$

155) The electric field intensity at a distance of 10 km from an antenna having a directive gain of 10 dB and radiating a total power of 60 kW is

ISRO-2010( )

[A] 0.6 V/m  
[C] 0.36 V/m

[B] 1.2 V/m  
[D]  $13.3 \mu\text{W/m}^2$

156) What is the characteristic impedance of a coaxial transmission line having inner conductor radius of 1mm , outer conductor radius of 2 mm and dielectric constant of 4.0 ?

ISRO-2010( )

[A] 50 ohm  
[C] 20.62 ohm

[B] 60 ohm  
[D] None

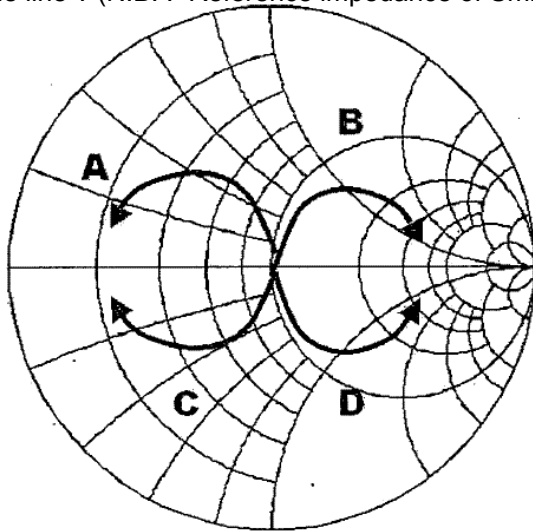
157) An impedance of  $-10 - j2$  ohms is connected to an another impedance of  $45 + j5$  ohms through a transmission line having a characteristic impedance of 50 ohms . Asses the stability of this circuit

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[A] Highly stable  
[C] Highly unstable

[B] Stability cannot be determined from the given information  
[D] Marginally unstable

158) A transmission line of characteristic impedance 75 ohms is terminated with an impedance of 50 ohms . The line length is increased from zero . What will be the locus of the input impedance at the other end of the line ? (N.B. : Reference impedance of Smith Chart = 50 ohms )



- [A] Locus [A]
- [C] Locus [C]

- [B] Locus [B]
- [D] Locus [D]

ISRO-2010( )

159) The value of the integral  $\int \sin z/z^3 .dz$  around the circle  $|z| = 2$  is

- [A] 1
- [C] - 1/2

- [B] 0
- [D] 1/2

ISRO-2010( )

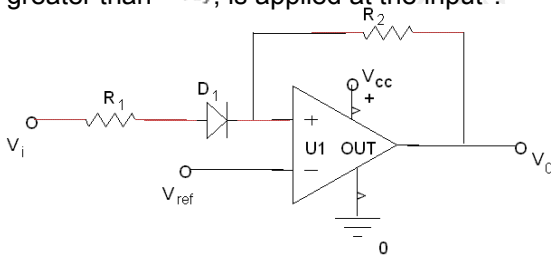
160) Which of the following functions have a jump discontinuity at  $x = 0$

- [A]  $g(x) = \ln |x|$
- [C]  $\begin{cases} \frac{\sin(x)}{x}, & x \neq 0 \\ 0, & x = 0 \end{cases}$

- [B]  $g(x) = 1/x^2$
- [D] None of the above

ISRO-2010( )

161) What would be the output of the following circuit , if a positive going unipolar pulse with an amplitude greater than  $V_{ref}$ , is applied at the input ?

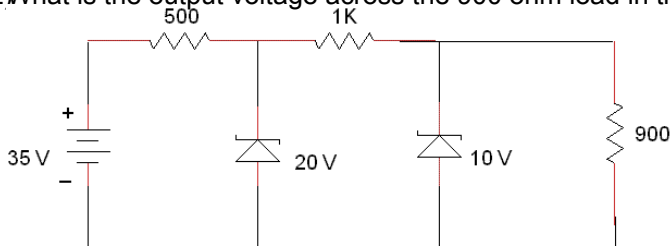


- [A]  $V_0$  will go high momentarily and return to low
- [C]  $V_0$  will go high and remain high

- [B]  $V_0$  will go low momentarily and return to high
- [D]  $V_0$  will not change its previous state

ISRO-2010( )

162) What is the output voltage across the 900 ohm load in the circuit given below ?



- [A] 10 V

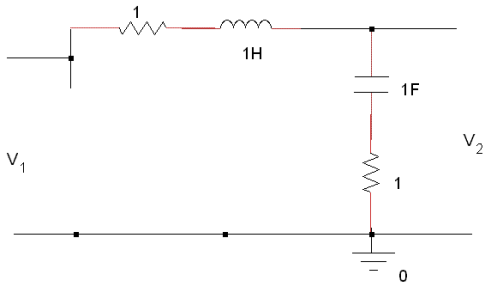
- [B] 14.67 V

ISRO-2010( )

[C]20 V

[D]9.47 V

163) What is the transfer function of the network given below ?



[A]  $(s + 1) / (2s + 1)$

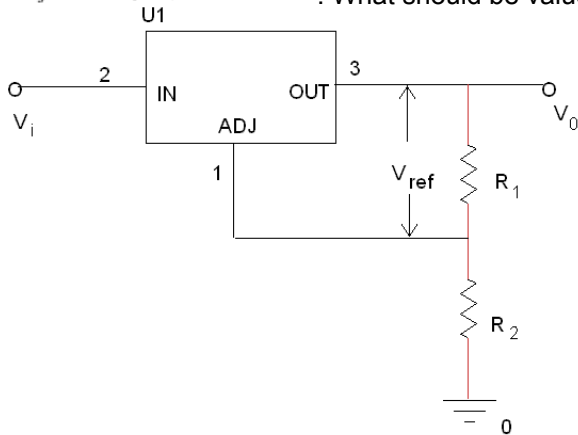
[B]  $1 / (1+s)$

[C]  $1 / (2s+1)$

[D]  $1 / (s^2 + 2s + 1)$

ISRO-2010( )

164) A voltage regulator having  $V_{ref} = 1.25 V$  need to generate 5V output . Assume that  $I_{adj} = 100 \mu A, R_1 = 10 k\Omega$ . What should be value of  $R_2$



[A] 30 kohm

[B] 33.33 kohm

[C] 16.66 kohm

[D] 22.22 kohm

ISRO-2010( )

165) f a counter having 10 FFs is initially at 0 , what count will it hold after 2060 pulses ?

[A] 000 000 1100

[B] 000 001 1100

[C] 000 001 1000

[D] 000 000 1110

ISRO-2009( )

166) A memory system of size 16 K bytes is required to be designed using memory chips which have 12 address lines and 4 data lines each . Then the number of such chips required to design the memory system is

[A] 2

[B] 4

[C] 8

[D] 16

ISRO-2009( )

167) Consider the following program for 8085

```

XRA A
LXI B , 0007H
LOOP: DCX B
 JNZ LOOP

```

The loop will be executed

[A] 8 times

[B] once

[C] 7 times

[D] infinite times

ISRO-2009( )

168) A certain JK FF has  $t_{pd} = 12 ns$ . The largest MOD counter that can be constructed from such FFs and still operate up to 10 MHz is

ISRO-2009( )

- [A] 16 [B] 256  
 [C] 8 [D] 128

169) Convolution of  $x(t + 5)$  with impulse function  $\delta(t - 7)$  is equal to

ISRO-2009( )

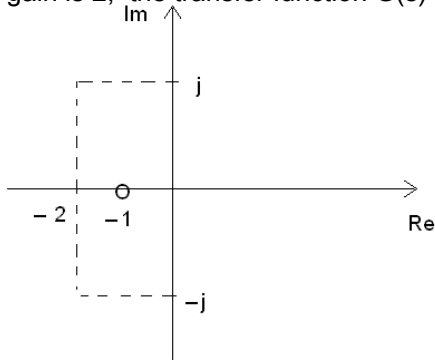
- [A]  $x(t - 2)$  [B]  $x(t + 12)$   
 [C]  $x(t - 12)$  [D]  $x(t + 2)$

170) The purpose of a Cassegrain feed in a parabolic reflector antenna is to

ISRO-2009( )

- [A] Achieve higher antenna gain [B] Reduce the antenna size  
 [C] Reduce the beam width [D] Ease of locating the feed at convenient point

171) A transfer function  $G(s)$  has pole-zero plot as shown in the figure. Given that the steady state function gain is 2, the transfer function  $G(s)$  will be given by



ISRO-2009( )

- [A]  $\frac{5(s + 1)}{s^2 + 4s + 4}$  [B]  $\frac{2(s + 1)}{s^2 + 4s + 5}$   
 [C]  $\frac{10(s + 1)}{s^2 + 4s + 5}$  [D]  $\frac{10(s + 1)}{(s + 2)^2}$

172) The impedance of a series RLC circuit is

ISRO-2009( )

- [A]  $\sqrt{R^2 + X_L^2 + X_C^2}$  [B]  $\sqrt{R^2 + X_L^2 - X_C^2}$   
 [C]  $\sqrt{R^2 + (X_L + X_C)^2}$  [D]  $\sqrt{R^2 + (X_L - X_C)^2}$

173) The advantage of  $\pi/4$  QPSK compared to conventional QPSK is ?

ISRO-2009( )

- [A]  $\pi/4$  QPSK requires less bandwidth compared to conventional QPSK [B]  $\pi/4$  QPSK produces lower envelope variation compared to conventional QPSK  
 [C]  $\pi/4$  QPSK receiver design is simple compared to conventional QPSK [D] There is no advantage

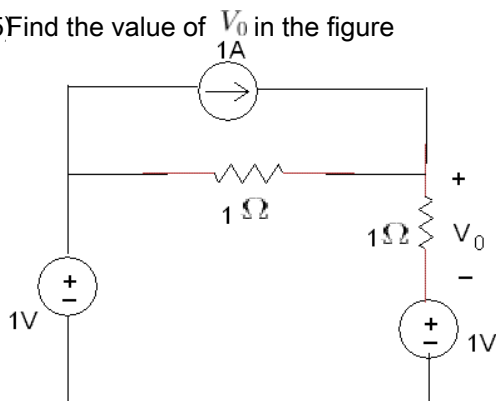
174) A moving coil iron ammeter may be compensated for frequency errors by

ISRO-2009( )

- [A] Series inductance [B] Shunt resistance  
 [C] Series resistor [D] Shunt capacitor



175) Find the value of  $V_0$  in the figure



- [A]  $1/2$  V [B]  $- 1/2$  V  
 [C] 0 V [D]  $- 3/2$  V

ISRO-2009( )

176) What is the approximate skin depth in copper at 100 MHz ?

- [A] 0.1 micron [B] 10 microns  
 [C] 10 mm [D] 100 mm

ISRO-2009( )

177) While designing a low noise amplifier, what is the importance of the noise resistance of a transistor ?

- [A] It gives the effective impedance offered by the input with respect to noise current  
 [B] It defines the criterion for conjugate matching of input impedance  
 [C] It tells us the resistance that would generate the same amount of noise at room temperature  
 [D] It tells us how rapidly the noise figure increases as we move away from the optimum source impedance

ISRO-2009( )

178) Unattenuated radiation field at the surface of the earth of a quarter - wave monopole will exist if the earth surface is

- [A] Lossy dielectric [B] Perfect insulator  
 [C] Perfectly conducting [D] None of these

ISRO-2009( )

179) Given that

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$$

Evaluate  $A^3 - 6A^2 + 11A - 10I$

- [A] Null matrix [B] Identity matrix  
 [C]  $- 4I$  [D] None of the above

ISRO-2009( )

180)  $\lim_{x \rightarrow 0} x \log \sin(x)$  is

- [A] 0 [B]  $1/2$   
 [C] 1 [D] 2

ISRO-2009( )

181) A 12 bit ADC is operating with a  $1 \mu s$  clock period and the total conversion time is seen to be  $14 \mu s$ . The ADC must be of

- [A] Flash type [B] Counting type  
 [C] Integrating type [D] Successive Approximation type

ISRO-2009( )

182) Which of the following types of devices is not field programmable ?

- [A] FPGA [B] ASIC  
 [C] CPLD [D] PLD

ISRO-2009( )

183) Which is the correct order of different process steps for a typical FPGA design ?

ISRO-2009( )

- [A] Functional simulation , Synthesis , Place &Route , Timing Verification  
 [B] Functional simulation , Timing Verification , Synthesis , Place &Route  
 [C] Timing Verification , Synthesis , Functional simulation , Place &Route  
 [D] Synthesis , Functional simulation , Timing Verification , Place &Route

184) The theoretical dividing line between Reduced Instruction Set computing (RISC) microprocessor and Complex Instructions Set Computing (CISC) microprocessor is

ISRO-2009( )

- [A] Instruction execution rate to be one instruction per clock cycle  
 [B] Number of address and data lines  
 [C] Number of pins in the chip  
 [D] None of the above

185) In a pulsed radar , the peak radar transmitter power is increased by a factor of 81 keeping all other radar parameters unchanged . The maximum range capability of the radar increases by a factor of

ISRO-2009( )

- [A] 81  
 [B] 9  
 [C] 27  
 [D] 3

186) A radar transmitter has a PRF of 1500 PPS and a pulse width of 1 micro second . Its duty cycle is

ISRO-2009( )

- [A] 0.0075  
 [B] 0.015  
 [C] 0.0015  
 [D] 0.00075

187) Which of the following technology results in least power dissipation

ISRO-2009( )

- [A] CMOS  
 [B] ECL  
 [C] TTL  
 [D] NMOS

188) A Power MOSFET is a

ISRO-2009( )

- [A] Current controlled device  
 [B] Frequency controlled device  
 [C] Voltage controlled device  
 [D] None of the above

189) The advantage of differential PSK (DPSK) over coherent PSK is

ISRO-2009( )

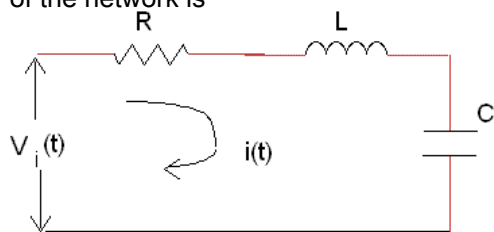
- [A] DPSK requires less bandwidth compared coherent PSK  
 [B] DPSK receiver design is simple compared to coherent PSK  
 [C] DPSK Bit error rate is lower than coherent PSK  
 [D] For same bandwidth , DPSK bit rate is higher compared to coherent PSK

190) An ideal current meter should have

ISRO-2009( )

- [A] Zero resistance  
 [B] Finite resistance  
 [C] Infinite resistance  
 [D] Very large resistance

191) For the network shown in the figure  $V_i(t)$  is the input and  $i(t)$  is the output . The transfer function  $\frac{I(s)}{V_i(s)}$  of the network is



ISRO-2009( )

- [A]  $\frac{C}{RCs^2 + LCs + 1}$   
 [B]  $\frac{C}{LCs^2 + RCs + 1}$   
 [C]  $\frac{Cs}{RCs^2 + LCs + 1}$   
 [D]  $\frac{Cs}{LCs^2 + RCs + 1}$

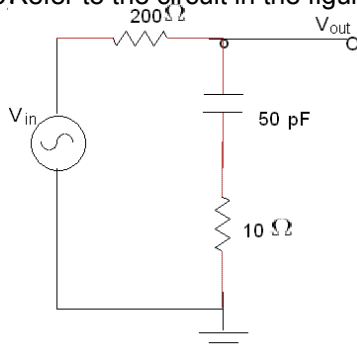
192) The length of a lossy shorted stub is  $1/32 \lambda$ . What will be the nature of its input impedance ?

ISRO-2009( )

- [A] A low inductive reactance in series with a low resistance  
 [C] A high capacitive reactance in series with a low resistance

- [B] A low capacitive reactance in shunt with a high resistance  
 [D] A high inductive reactance in series with a low resistance

193) Refer to the circuit in the figure . Which of the following statements is NOT true about this circuit ?



ISRO-2009( )

- [A] It is a low pass filter  
 [C] Its phase shift varies monotonically with the frequency

- [B] It has a finite attenuation at finite frequency  
 [D] It has one pole and one zero

194) Which of the following is the correct continuity equation :

ISRO-2009( )

[A]  $\nabla \cdot J = \frac{\partial \rho}{\partial t}$

[B]  $\nabla \cdot J = -\frac{\partial \rho}{\partial t}$

[C]  $\nabla \cdot J = 0$

[D]  $\nabla \cdot J = -\frac{\partial E}{\partial t}$

195)  $\alpha, \beta$  are the roots of the equation  $x^2 + x + 1 = 0$ . Then  $\alpha^{3n} + \beta^{3n}$  is

ISRO-2009( )

- [A] 1  
 [C] 0

- [B] 2  
 [D] 3

196) A point moving in the complex plane satisfies the following relation

$z^2 + z^{*2} = 8$ ,

where  $z^*$  stands for the complex conjugate of  $z$ .

The difference of the distances of the moving point from  $(2\sqrt{2}, 0)$  and  $(-2\sqrt{2}, 0)$  is

ISRO-2009( )

- [A] 8  
 [C] 4

- [B] 2  
 [D] 6

197) The greatest negative number which can be stored in a computer that has 8-bit word length and uses 2's complement arithmetic is

ISRO-2009( )

- [A] - 256  
 [C] - 128

- [B] - 255  
 [D] - 127

198) Which of the following ADCs uses over sampling in its operation

ISRO-2009( )

- [A] Sigma - delta ADC  
 [C] Successive Approximation Register ADC

- [B] Count ramp converter  
 [D] Flash Converter

199) A mealy state machine's output depends on

ISRO-2009( )

- [A] State and outputs  
 [C] State

- [B] Inputs  
 [D] State and Inputs

200) The characteristic equation of the T-FF is given by

ISRO-2009( )

[A]  $Q^+ = \bar{T}Q$   
 [C]  $Q^+ = TQ$

[B]  $Q^+ = T\bar{Q}$   
 [D]  $Q^+ = T\bar{Q} + Q\bar{T}$

201) Percentage modulation of an AM wave having a power content of 8 KW at carrier frequency and 2 KW in each of its side bands is ISRO-2009( )

[A] 60 % [B] 70 %  
 [C] 100 % [D] 80 %

202) Approximate equivalent noise temperature (deg.K) of an amplifier with a noise factor of 1.04 is ISRO-2009( )

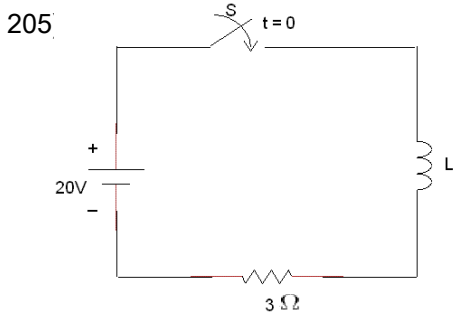
[A] 301.6 [B] 11.6  
 [C] 278.4 [D] 5.8

203) A differential amplifier is used in the input stage of Op-Amps to achieve very high ISRO-2009( )

[A] open -loop gain [B] bandwidth  
 [C] slew rate [D] CMRR

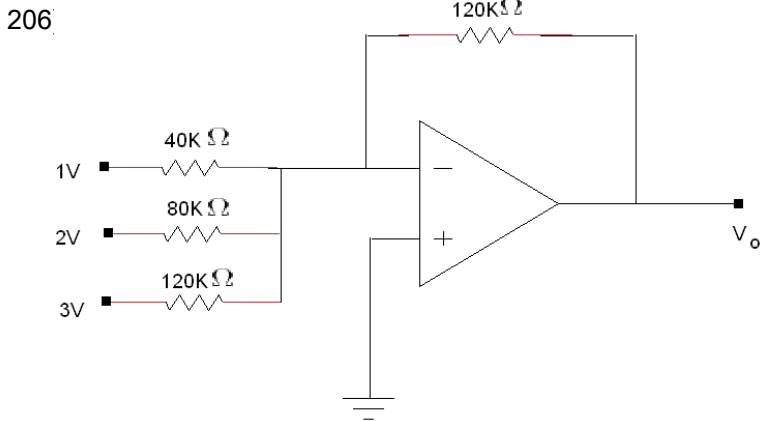
204) Which two-port parameters are best suited for analyzing a series-shunt feedback circuit ? ISRO-2009( )

[A] Z-parameters [B] H-Parameters  
 [C] Y-Parameters [D] S-Parameters



For the circuit shown in the figure , the switch is closed at  $t = 0$  . After some time when the current in the inductor was 6A , the rate of change of current through the inductor was 4A/sec . The value of the inductor is ISRO-2009( )

[A] 0.5 H [B] 1.5 H  
 [C] 1.0 H [D] Indeterminate



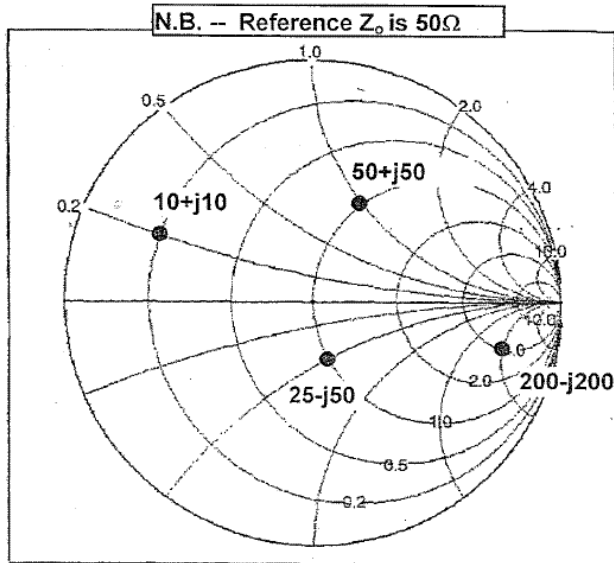
In the circuit shown in the above figure , the value of output  $V_0$  is ISRO-2009( )

[A] + 6V [B] - 9V  
 [C] - 6V [D] + 9V

207) The characteristic equation of a closed loop control system is given as  $s^2 + 4s + 16 = 0$  . The resonant frequency in radian/sec of the system is ISRO-2009( )

[A] 2 [B]  $2\sqrt{3}$   
 [C] 4 [D]  $2\sqrt{2}$

208) Which point in the Smith Chart is labeled with the WRONG impedance ?



- [A]  $10 + j10$  [B]  $50 + j50$   
 [C]  $200 - j200$  [D]  $25 - j50$

ISRO-2009( )

209) If a line is terminated in an open circuit, the VSWR is

- [A]  $\infty$  [B] 0  
 [C] 1 [D] -1

ISRO-2009( )

210) Unit of relative permeability is

- [A] Henry / meter [B] Henry  
 [C] Henry - meter [D] It is dimensionless

ISRO-2009( )

211)  $f(x) = [\tan^2 x]$

( [ ] stands for greatest integer function )

- [A]  $f(x)$  continuous at  $x = 0$  [B] limit  $f(x)$  does not exist as  $x$  tend to 0  
 [C]  $f(0) = 1$  [D]  $f(x)$  not derivable at  $x = 0$

ISRO-2009( )

212) Number of real values of  $(a + ib)^{1/n} + (a - ib)^{1/n}$  is

- [A] 0 [B] 1  
 [C] n [D] None of the above

ISRO-2009( )

213) A 5 bit DAC has a current output. For a digital input of 10100, an output current of 10 mA is produced. What will be the output current for a digital input of 11101 ?

- [A] 14.5 mA [B] = 10 mA  
 [C] = 100 mA [D] Not possible to calculate

ISRO-2009( )

214) The ethernet protocol uses

- [A] CSMA / CA [B] SCPC  
 [C] CSMA/CD [D] Slotted ALOHA

ISRO-2009( )

215) A micro controller differs from a microprocessor in terms of

- [A] I/O interfaces and instruction decoding [B] Memory configuration and I/O interfaces  
 [C] Data bus width and clock speed [D] Memory configuration and instruction decoding

ISRO-2009( )

216) An 8-bit microcontroller has an external RAM with the memory map from 8000H to 9FFFH. The number of bytes this RAM can store is

ISRO-2009( )

- [A] 8193 [B] 8192  
 [C] 8191 [D] 8000

217) An audio frequency of 15 KHz is frequency modulated with a deviation of 75 KHz . The resulting bandwidth is

ISRO-2009( )

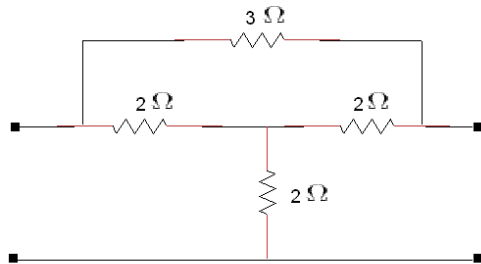
- [A] 180 KHz [B] 150 KHz  
 [C] 210 KHz [D] 240 KHz

218) A 1KW carrier is Amplitude Modulated to a depth of 60% . The total power in the modulated carrier is

ISRO-2009( )

- [A] 1 kW [B] 1.06 kW  
 [C] 1.6 kW [D] 1.18 kW

219.



The  $y_{21}$  parameter of the network shown in the given figure will be

ISRO-2009( )

- [A] 1/6 [B] - 1/6  
 [C] 1/3 [D] - 1/3

220) An inductance of 1H is realized using air core with 100 turns . What will be the inductance if the number of turns are doubled ?

ISRO-2009( )

- [A] 1 H [B] 0.5 H  
 [C] 2 H [D] None of these

221) An inductor of inductance 0.1 H , carrying current of 6 Amps will store energy of

ISRO-2009( )

- [A] 6 Joules [B] 36 Joules  
 [C] 1.8 Joules [D] 3.6 Joules

222) A coil has self resistance of 5  $\Omega$  and inductance of 1  $\mu H$  . The value of Q at 1 MHz frequency is

ISRO-2009( )

- [A] 200 [B] 100  
 [C] 40 [D] None of these

223)

The closed loop transfer function of a unity feedback control system is  $G(s) = \frac{1}{(s + 2)^2}$  . The closed loop transfer function will have poles at

ISRO-2009( )

- [A] - 2,  $\pm j$  [B] - 2, -1  
 [C] -2, - 2 [D] -2, 2

224) The dominated mode of propagation in microstrip line in low frequency approximation is

ISRO-2009( )

- [A]  $TM_{11}$  [B] Quasi -TEM  
 [C] TEM [D]  $TE_{01}$

225) Consider a transmission line of characteristic impedance 50 ohms and the line is terminated at one end by +j50 ohms , the VSWR produced in the transmission line will be

ISRO-2009( )

- [A] + 1 [B] zero  
 [C] - 1 [D] infinity

226) The divergence of magnetic flux density is

ISRO-2009( )

- [A]j [B]  $\rho$   
 [C]0 [D]  $\infty$

227) A straight line and a circle of radius a are given . A chord is drawn at random to this circle parallel to the given line . Expected length of the chord is

ISRO-2009( )

- [A] 2a [B]  $\pi a$   
 [C]  $\pi a/2$  [D] None of the above

228) There is a function f(x) , such that f(0) = 1 and f'(0) = - 1 and f(x) is positive for all values of x . Then ,

ISRO-2009( )

- [A] f'' (x) <0 for all x [B] - 1 <f'' (x) <0 for all x  
 [C] -2 <f'' (x) <-1 for all x [D] None of the above

229) Interrupt latency is the time elapsed between :

ISRO-2009( )

- [A] Occurrence of an interrupt and its detection by the CPU [B] Assertion of an interrupt and the start of the associated ISR  
 [C] Assertion of an interrupt and the completion of associated ISR [D] Start and completion of associated ISR

230) Inverse Fourier transform of signal

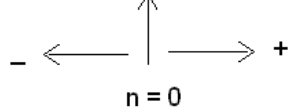
$$X(j\omega) = 2\pi\delta(\omega) + \pi\delta(\omega - 4\pi) + \pi\delta(\omega + 4\pi)$$

ISRO-2009( )

- [A]  $1 + \cos 4\pi t$  [B]  $\pi(1 - \cos 4\pi t)$   
 [C]  $2\pi(1 - \cos 4\pi t)$  [D]  $2\pi(1 + \cos 4\pi t)$

231) Determine the discrete-time Fourier Transform for the signal

$$x[n] = [-2, -1, 0, 1, 2]$$



ISRO-2009( )

- [A]  $2j(2\sin 2\omega + \sin \omega)$  [B]  $- 2j(2\sin 2\omega + \sin \omega)$   
 [C]  $2(2\cos 2\omega - \cos \omega)$  [D]  $- 2(2\cos 2\omega - \cos \omega)$

232) Auto-correlation of a sinusoid s(t) = A sin( $\omega t$ ) is

ISRO-2009( )

- [A]  $(A^2/2) \sin(\omega\tau)$  [B]  $(A/2) \sin(\omega\tau)$   
 [C]  $(A^2/2) \cos(\omega\tau)$  [D]  $(A/2) \cos(\omega\tau)$

233) A source produces 4 symbols with probabilities 1/2 , 1/4 , 1/8 , 1/8 . For this source , a practical coding scheme has an average codeword length of 2 bits/symbol . The efficiency of the code is

ISRO-2009( )

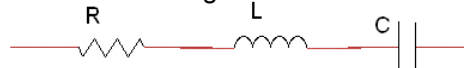
- [A] 1 [B] 7/8  
 [C] 1/2 [D] 1/4

234) When signal frequency is 2000 KHz and IF is 455 KHz , the image frequency could be

ISRO-2009( )

- [A] 2910 KHz [B] 1645 KHz  
 [C] 2455 KHz [D] 2090 KHz

235) The Q of RLC tuned circuit with source voltage V in the figure is 100 at resonant frequency of 100 KHz , what is the voltage  $V_L$  across inductor at resonance ?

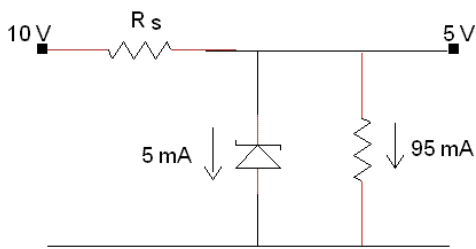


ISRO-2009( )

- [A] 50 V [B]  $V_L - V_C$   
 [C] 100 V [D]  $V_R - V_C$



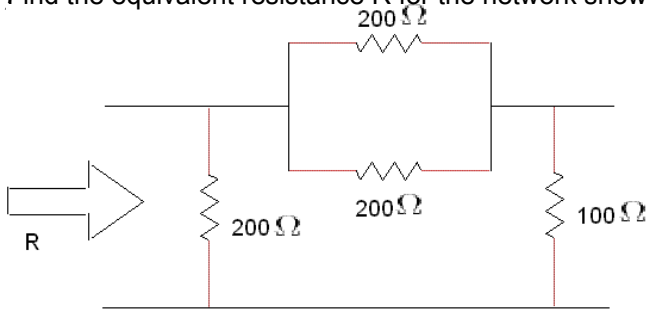
236) A 5V reference is drawn from the circuit shown in the figure . Zener diode of 40 mW and 5V with firing current of 5mA is used . The value of  $R_s$  is



ISRO-2009( )

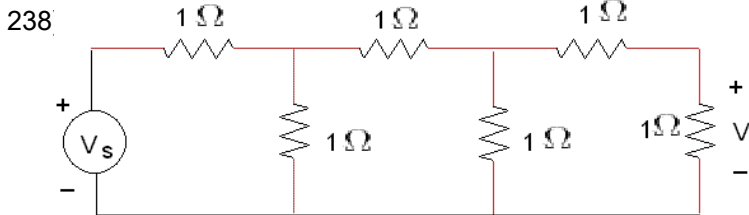
- [A] 50 ohms [B] 500 ohms  
 [C] 75 ohms [D] 470 ohms

237) Find the equivalent resistance  $R$  for the network shown in the figure



ISRO-2009( )

- [A] 200 ohms [B] 101 ohms  
 [C] 220 ohms [D] 100 ohms



The Voltage across last resistor is  $V$  . All resistors are unity . Then  $V_s$  is given by

ISRO-2009( )

- [A] 13 V [B] 8 V  
 [C] 4 V [D] None of these

239) Natural frequency of a unity feedback control system of transfer function

$$G(s) = \frac{10}{s(s+1)} \text{ is}$$

ISRO-2009( )

- [A] 0.5 rad/sec [B] 3.16 rad/sec  
 [C] 4.6 rad/sec [D] None of these

240) Which of the following conditions will not guarantee a distortionless transmission line ?

ISRO-2009( )

- [A]  $R = 0, G = 0$  [B] Very low frequency range ( $R \gg \omega L, G \gg \omega C$ )  
 [C]  $R/L = G/C$  [D] Very high frequency range ( $R \ll \omega L, G \ll \omega C$ ).

241) For a line of characteristic impedance  $Z_0$  terminated in a load  $Z_R$  such that  $Z_R > Z_0$ , the Voltage Standing Wave Ratio (VSWR) is given by

ISRO-2009( )

- [A]  $Z_R/Z_0$  [B]  $Z_0$   
 [C]  $Z_R$  [D]  $Z_0/Z_R$

242) The beam width of a reflector antenna of diameter = 70 cm at 30 GHz is

ISRO-2009( )

[A] 3.7 degree

[B] 0.5 degree

[C] 1.1 degree

[D] 1 degree

243)  $T_r = r/(1 + r^2 + r^4)$   
 $\sum_{r=1}^{\infty} T_r =$

[A] 1/4

[B] 1

[C] None of the above

[D] 1/2

ISRO-2009( )

244) A man with n keys wants to open a clock . He tries his keys at random . The expected number of attempts for this success is (keys are replaced after every attempt)

[A] n/2

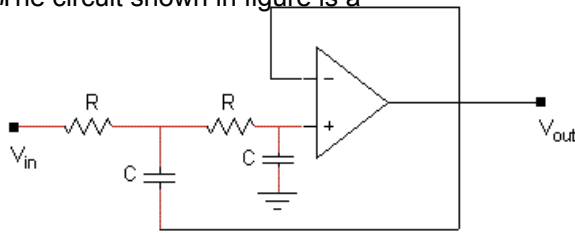
[B] n

[C]  $\sqrt{n}$

[D] None of the above

ISRO-2009( )

245) The circuit shown in figure is a



[A] Low-pass Filter

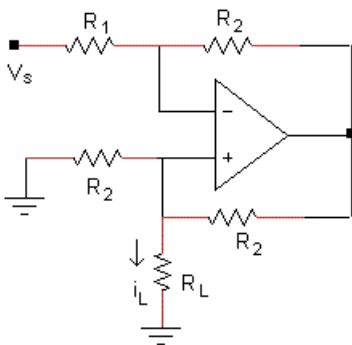
[B] High-pass filter

[C] Band-pass filter

[D] Band-reject filter

ISRO-2008( )

246) In the op-amp circuit given in figure , the load current  $i_L$  is



[A]  $-\frac{v_s}{R_2}$

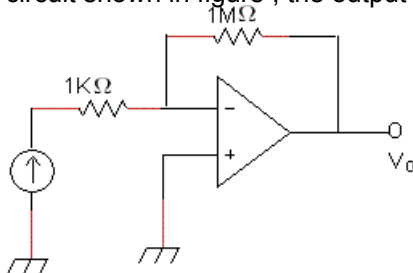
[B]  $\frac{v_s}{R_2}$

[C]  $-\frac{v_s}{R_L}$

[D]  $\frac{v_s}{R_1}$

ISRO-2008( )

247) An op-amp has an offset voltage of 1 mV and is ideal in all other respects . If this op-amp is used in the circuit shown in figure , the output voltage will be

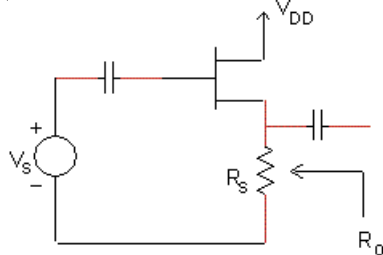


ISRO-2008( )

- [A] 1mV  
 [C] ±1V

- [B] 1V  
 [D] 0 V

248) For the circuit shown, if  $g_m = 3 \times 10^{-3}$  and  $R_s = 3000\Omega$ , then the approximate value of  $R_0$  is



- [A] 3000  $\Omega$   
 [C] 300  $\Omega$

- [B] 1000/3  $\Omega$   
 [D] 100  $\Omega$

ISRO-2008( )

249) Where does the operating point of a class-B power amplifier lie ?

- [A] At the middle of a.c. load line  
 [C] Inside the collector cut-off region on a.c load line

- [B] Approximately at collector cut-off on both the d.c and a.c load lines  
 [D] At the middle point of d.c load line

ISRO-2008( )

250) The Laplace transform of  $e^{-2t}$  is

- [A]  $\frac{1}{2s+2}$   
 [C]  $\frac{2}{s+1}$

- [B]  $\frac{2}{s}$   
 [D]  $\frac{1}{s+2}$

ISRO-2008( )

251) The system with characteristic equation  $s^4 + 3s^3 + 6s^2 + 9s + 12 = 0$

- [A] Stable  
 [C] Marginally stable

- [B] Unstable  
 [D] Marginally unstable

ISRO-2008( )

252) Compared to field effect photo transistors, bipolar photo transistors are

- [A] More sensitive and faster  
 [C] More sensitive and slower

- [B] Less sensitive and slower  
 [D] Less sensitive and faster

ISRO-2008( )

253) The output V-I characteristics of an enhancement type MOSFET has

- [A] Only an ohmic region  
 [C] An ohmic region at low voltage value followed by a saturation region at higher voltages

- [B] Only a saturation region  
 [D] An ohmic region at large voltage values preceded by a saturation region at lower voltages

ISRO-2008( )

254) Which of the following relation is valid ?

Where MTBF = Mean Time Between Failures  
 MTTF = Mean Time To Failures  
 MTTR = Mean Time To Repair

- [A]  $MTBF = MTTF + MTTR$   
 [C]  $\frac{1}{MTTR} + \frac{1}{MTTF} = \frac{1}{MTBF}$

- [B]  $MTTR + MTTF + MTBF = 1$   
 [D]  $MTBF \cdot MTTF \cdot MTTR = 1$

ISRO-2008( )

255) Two transistors have the same value of  $\alpha$  but different gain bandwidth products. One of them is a germanium transistor and the other is a silicon transistor. Both the transistors have similar geometries and base width. The transistor with lower GB product

- [A] is the germanium  
 [C] both are same

- [B] is the silicon  
 [D] Cannot be identified unless more information is available

ISRO-2008( )

256) The following transistor configuration has the highest input impedance

- [A]CC [B]CE ISRO-2008( )  
[C]CB [D]All of the above
- 257) If  $t_c, h$  and  $t_m$  specify the cache access time, hit ratio and main memory access time then the average access time is (given  $t_c = 160 \text{ ns}, t_m = 960 \text{ ns}, h = 0.90$ ) ISRO-2008( )  
[A] 160 ns [B] 960 ns  
[C] 256 ns [D]  $960 \times 0.9 \text{ ns}$
- 258) The advantage of write (copy) back data cache organization over write through organization is ISRO-2008( )  
[A] Main memory consistency [B] Write allocate on write miss  
[C] Less memory bandwidth requirement [D] Higher capacity
- 259)  $E^2 \text{ PROM}$  storage element is ISRO-2008( )  
[A] Cross-coupled latch [B] Isolated gate transistor  
[C] Capacitor [D] Flip flop
- 260) A programme having features such as data abstraction, encapsulation and data hiding, polymorphism inheritance is called ISRO-2008( )  
[A] Structured programme [B] Object oriented programme  
[C] Open source programme [D] Real time programme
- 261) The signal received from a circularly polarized signal by an antenna with linear polarization compared to the signal received by same circularly polarized antenna will be ISRO-2007( )  
[A] Maximum [B] Zero  
[C] 3 dB less [D] 3 dB more
- 262) The modulus of  $1 + \cos \alpha + i \sin \alpha$  is ISRO-2008( )  
[A]  $2 \sin \frac{\alpha}{2}$  [B]  $2 \cos \frac{\alpha}{2}$   
[C]  $\sin^2 \frac{\alpha}{2} - 1$  [D]  $\cos^2 \frac{\alpha}{2} - 1$
- 263) The 8-bit DAC produces 1.0 V for a digital input of 00110010. What is the largest output it can produce? ISRO-2008( )  
[A] 5 V [B] - 5V  
[C] 5.5 V [D] 5.10 V
- 264) The fastest ADC among the following is ISRO-2008( )  
[A] Successive approximation type [B] Dual slope type  
[C] Sigma-Delta ADC [D] Flash converter
- 265) The mod number of a Johnson counter will be always equal to ..... the number of flip flops used ISRO-2008( )  
[A] same [B] twice  
[C]  $2^N$  where N is the number of flip flops [D] None of these
- 266) Odd parity generator uses ..... logic ISRO-2008( )  
[A] XNOR [B] XOR  
[C] Sequential [D] OR
- 267) Which type of memory has fast erase and write times ISRO-2008( )  
[A] EPROM [B] EEPROM  
[C] Flash memory [D] None of these
- 268) The performance gain that can be obtained by improving some portion of a computer can be calculated using

- [A] Moore's law [B] Dijkstra's algorithm ISRO-2008( )  
[C] Amdahl ' s law [D] Murphy's law
- 269) Microprogramming refers to ISRO-2008( )  
[A] Emulation [B] Programming at micro level  
[C] Control unit [D] Array Processing
- 270) An array processor is a ..... machine ISRO-2008( )  
[A] SIMD [B] MIMD  
[C] SISD [D] MISD
- 271)..... machine tend to make use of internal resources of the processor , a rich set of registers and a pipelined organization ISRO-2008( )  
[A] CISC [B] Parallel processor  
[C] RISC [D] Array processor
- 272) Difference between a switch and Hub ISRO-2008( )  
[A] Both are same [B] Switch avoids flooding  
[C] Hub avoids broadcast [D] None of the above
- 273) 100 Base T refers to ISRO-2008( )  
[A] Fibre connectivity [B] BNC connectors  
[C] SONET [D] Twisted pair
- 274) A S-R flip-flop with a clock input can be converted to a 'D' flip flop using ISRO-2008( )  
[A] Two inverters [B] the flip flop outputs ( $Q$  and  $\bar{Q}$ ) connected to its inputs (S &R)  
[C] One inverter [D] Not possible
- 275) An 8-bit ADC has a full scale input of 2.55 V . If other cumulative errors are 2.55 mV , determine the maximum error ISRO-2008( )  
[A] 10 mV [B] 12.55 mV  
[C] 7.45 mV [D] 2.55 mV
- 276) A counter is designed with six stages of flip flops . Determine the output frequency at the last (sixth) stage , when input frequency is 1 MHz ISRO-2008( )  
[A] 1 MHz [B] 166 KHz  
[C] 15.625 KHz [D] zero
- 277) The ethernet protocol uses ISRO-2008( )  
[A] CSMA/CA [B] SCPC  
[C] CSMA/CD [D] Slotted ALOHA
- 278) The value of c which makes the angle  $45^\circ$  between  $\bar{a} = i + cj$  and  $\bar{b} = i + j$  is ISRO-2008( )  
[A] 1 [B]  $\frac{1}{\sqrt{2}}$   
[C]  $-\frac{1}{\sqrt{2}}$  [D] 0
- 279) In a daisy chained connection to the CPU , the peripheral whose interrupt request has the highest priority is the one ISRO-2008( )  
[A] With the largest vector address [B] With the highest speed of operation  
[C] Electrically nearest to the CPU [D] Electrically farthest from the CPU

280) RS-232 interface

ISRO-2008( )

- [A] Uses only positive voltage [B] Cannot transmit signals over long distance  
 [C] Uses only negative voltage [D] A logic high uses positive voltage

281) The number of comparators required in an 8-bit flash type A/D converter is

ISRO-2008( )

- [A] 256 [B] 255  
 [C] 9 [D] 8

282) Minimum number of 2-input NAND gates that will be required to implement the function :  
 $Y = AB + CD + EF$  is

ISRO-2008( )

- [A] 4 [B] 5  
 [C] 6 [D] 7

283) In a ripple counter how many changes in state happens when count changes from 7 to 8 ?

ISRO-2008( )

- [A] 1 [B] 2  
 [C] 3 [D] 4

284) A programmable device (PROM) is

ISRO-2008( )

- [A] programmable OR and fixed AND array [B] programmable AND and fixed OR array  
 [C] programmable AND and programmable OR array [D] None

285) In asynchronous circuits, which of the following best explains a dynamic hazard

ISRO-2008( )

- [A] Output changes several times for a single change in input [B] Output changes to a different state for a single change in an input  
 [C] Output changes momentarily when it is supposed to remain constant for a single change in an input [D] None of the above

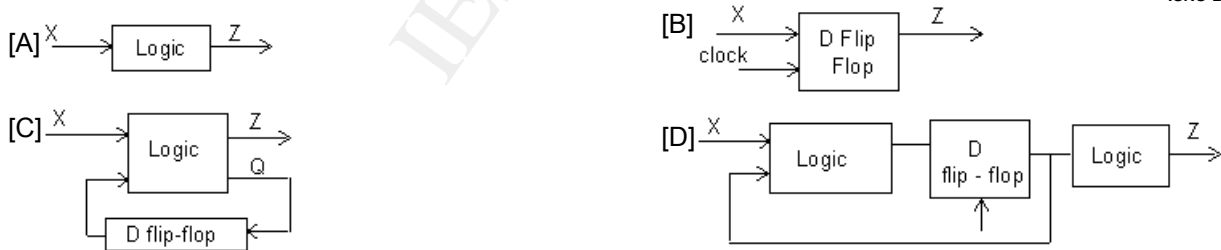
286) Digital signal processors use a computer architecture derived from

ISRO-2008( )

- [A] Harvard Architecture [B] Von-Neumann Architecture  
 [C] Cray Architecture [D] None of the above

287) Which of the following represents the Moore model for sequential circuits ?

ISRO-2008( )



288) An anti-aliasing filter is

ISRO-2008( )

- [A] An analog filter [B] A digital filter  
 [C] Can be analog or digital [D] None of the above

289) Which of the following filter has the fastest roll-off

ISRO-2008( )

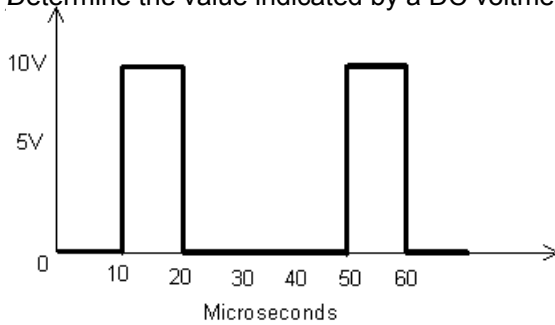
- [A] R-C [B] Bessel  
 [C] Butterworth [D] Chebyshev

290) Find the rms value of the signal  $x(t) = 5 \cos\left(50t + \frac{\pi}{3}\right)$

ISRO-2008( )

- [A]  $\sqrt{5}$  [B]  $\sqrt{5 \times 50t}$   
 [C]  $\sqrt{50 + \frac{\pi}{3}}$  [D]  $\sqrt{12.5}$

291) Determine the value indicated by a DC voltmeter for the waveform given below



- [A] 0 V [B] 2.5 V  
 [C] 10 V [D] 5 V

ISRO-2008( )

292) Evaluate the function  $\int_0^{\infty} t^2 \delta(t-3) dt$

- [A]  $e^{-t^2}$  [B]  $\frac{t^3}{3}$   
 [C]  $t^2(t-3)$  [D] 9

ISRO-2008( )

293) A husband and wife appear in an interview for two vacancies for same post. The probability of husband getting selected is  $\frac{1}{5}$  while the probability of wife getting selected is  $\frac{1}{7}$ . Then the probability that anyone of them getting selected is

- [A]  $\frac{11}{35}$  [B]  $\frac{12}{35}$   
 [C]  $\frac{1}{35}$  [D]  $\frac{34}{35}$

ISRO-2008( )

294) The rms value of Complex waveforms are measured using

- [A] Transistor Voltmeter [B] Differential Voltmeter  
 [C] High bandwidth Voltmeter [D] Voltmeter containing heat sensing elements such as thermocouples

ISRO-2008( )

295) Find the fundamental period T of the following continuous signal

$$x(t) = 20 \cos(10\pi t) + \frac{\pi}{6}$$

- [A]  $\frac{\pi}{6}$  sec [B]  $\frac{20 \times 10\pi}{T}$  sec  
 [C] 5 sec [D]  $\frac{1}{5}$  sec

ISRO-2008( )

296) Mark the incorrect relation

- [A]  $D = \epsilon E$  [B]  $B = \mu H$   
 [C]  $J = \sigma E$  [D]  $B = \mu D$

ISRO-2007( )

297) What will be dB gain for an increase of power level from 13 to 26 W

- [A] 1 [B] 2  
 [C] 8 [D] 3

ISRO-2007( )

298) The oscillator with the best frequency stability and accuracy is

- [A] Hartley oscillator [B] Colpitts oscillator  
 [C] Trickler feedback oscillator [D] Crystal controlled oscillator

ISRO-2007( )

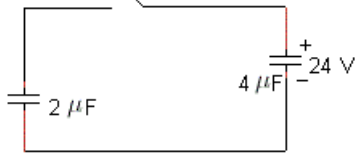
299) The desirable properties of transformer core material are

- [A] Low permeability and low hysteresis loss [B] High permeability and high hysteresis loss  
 [C] High permeability and low hysteresis loss [D] Low permeability and high hysteresis loss

ISRO-2007( )



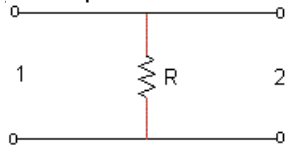
300) In the circuit shown the switch closes at  $t = 0$ . The voltage across  $4 \mu F$  capacitor in ideal condition changes to



ISRO-2008( )

- [A] 0 [B] 16 V  
 [C] 15 V [D] 24 V

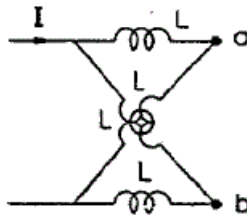
301) The 2-port network of figure A has open circuit impedance parameters given by matrix



ISRO-2008( )

- [A]  $\begin{bmatrix} R & R \\ R & R \end{bmatrix}$  [B]  $\begin{bmatrix} R & 0 \\ 0 & R \end{bmatrix}$   
 [C]  $\begin{bmatrix} \infty & R \\ R & \infty \end{bmatrix}$  [D]  $\begin{bmatrix} R & \infty \\ \infty & R \end{bmatrix}$

302) The network shown in the figure draw a current  $I$ . If the ends  $a$  and  $b$  are shorted, the current drawn would be



ISRO-2008( )

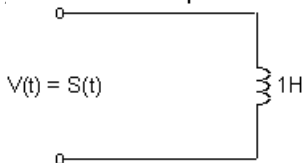
- [A]  $6 I$  [B]  $4 I$   
 [C]  $2 I$  [D]  $I$

303) As compared to a full-wave rectifier using two diodes, the four diode bridge rectifier has the dominant advantage of

ISRO-2008( )

- [A] higher current carrying capacity [B] lower peak inverse voltage  
 [C] lower ripple factor [D] higher efficiency

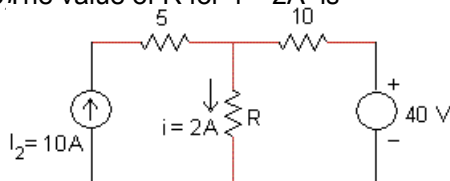
304) When a unit impulse voltage is applied to an inductor of 1H, the energy supplied by the source is



ISRO-2008( )

- [A]  $\infty$  [B] 1 J  
 [C]  $1/2$  J [D] 0

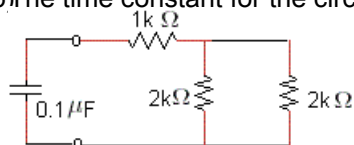
305) The value of R for  $i = 2A$  is



ISRO-2008( )

- [A]5 [B] 10  
 [C]40 [D]60

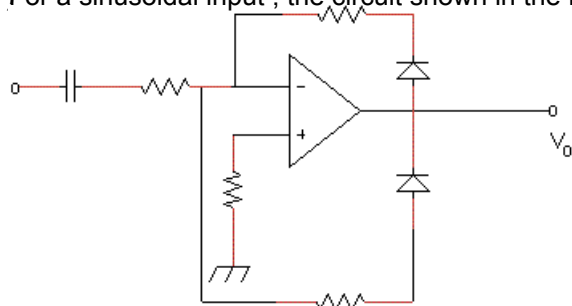
306)The time constant for the circuit shown below is



- [A]0.2 microsecond [B]0.8 millisecond  
 [C]0.4 millisecond [D]0.2 millisecond

ISRO-2008( )

307)For a sinusoidal input , the circuit shown in the figure will act as a



- [A]Pulse generator [B]Ramp generator  
 [C]Full-wave rectifier [D]Voltage doubler

ISRO-2008( )

308)A second order band-pass active filter can be obtained by cascading a low pass second order section having cut-off frequency  $f_{OH}$  with a high pass second order section having cut-off frequency  $f_{OL}$  provided

- [A] $f_{OH} > f_{OL}$  [B] $f_{OH} < f_{OL}$   
 [C] $f_{OH} = f_{OL}$  [D] $f_{OH} \leq \frac{1}{2}f_{OL}$

ISRO-2008( )

309)If  $\alpha = 0.995$ ,  $I_E = 10mA$  and  $I_{co} = 0.5 \mu A$ , then  $I_{CEO}$  will be

- [A]100  $\mu A$  [B]10.1 mA  
 [C]25  $\mu A$  [D]10.5 mA

ISRO-2008( )

310)The library function exit ( ) causes as exit form

- [A]the loop in which it occurs [B]the block in which it occurs  
 [C]the functions in which it occurs [D]the programme in which it occurs

ISRO-2008( )

311)The "go to statement " causes control to go to

- [A]An operator [B]A label  
 [C]A variable [D]A function

ISRO-2008( )

312)The differential equation satisfying  $y = Ae^{3x} + Be^{2x}$  is

- [A] $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} - 6y = 0$  [B] $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} + 6y = 0$   
 [C] $\frac{d^2y}{dx^2} + 5\frac{dy}{dx} + 6y = 0$  [D] $\frac{d^2y}{dx^2} - 5\frac{dy}{dx} - 6y = 0$

ISRO-2008( )

313)For an energy signal  $g(t)$  and its time shifted version  $f(t - T)$  , the

- [A]amplitude spectra are identical and their phase spectra are also identical [B]amplitude spectra are identical but their phase spectra are different  
 [C]amplitude spectra are different but their phase spectra are identical [D]amplitude spectra and their phase spectra are different

ISRO-2008( )

- 314) As the modulation index of an FM signal with sinusoidal modulation is increased from zero to two, the power in the carrier component will ISRO-2008( )
- [A] Decrease continuously [B] Increase continuously  
[C] First increase, becomes zero and then decrease [D] First decrease, becomes zero and then increase
- 315) For a short wave radio link between two stations via the ionosphere, the ratio of the maximum usable frequency to the critical frequency ISRO-2008( )
- [A] is always less than 1 [B] May be  $\leq 1$  depending on the distance between the two stations  
[C] is always greater than 1 [D] Does not depend on the distance between the two stations
- 316) A carrier voltage is simultaneously modulated by two sine waves causing modulation indices 0.4 and 0.3. The overall modulation index is ISRO-2008( )
- [A] 0.35 [B] 0.7  
[C] 0.5 [D] Can not be calculated unless the phase relations are known
- 317) If each stage has a gain of 10 dB, and noise figure of 10 dB, then the overall noise figure of a two stage cascade amplifier will be ISRO-2008( )
- [A] 10 [B] 1.09  
[C] 1.0 [D] 10.9
- 318) De-emphasis circuit is used ISRO-2008( )
- [A] To attenuate high frequencies [B] To attenuate low frequencies  
[C] To attenuate midband frequencies [D] None of the above
- 319) An amplifier has an input power of 2 microwatts. The power gain of the amplifier is 60 dB. The output power will be ISRO-2008( )
- [A] 6 microwatts [B] 120 microwatts  
[C] 2 milliwatts [D] 2 watts
- 320) A transmission line has a VSWR of 2, the reflection coefficient is ISRO-2008( )
- [A] 1/3 [B] 0  
[C] 1/4 [D] 1/2
- 321) Which vacuum based device is widely used as a power amplifier in satellite communication system ISRO-2008( )
- [A] Amplitron [B] Klystron  
[C] Magnetron [D] TWT
- 322) Maxwell's equations establish the relationship between  $\vec{E}$ ,  $\vec{D}$ ,  $\vec{H}$  and  $\vec{B}$  at any point in a continuous medium. When we move from one medium to another, then which of the following statement is correct ISRO-2008( )
- [A] At the boundary separating the two media, the tangential components of  $\vec{E}$  and  $\vec{H}$  are continuous [B] At the boundary separating the two media, the tangential components of only  $\vec{E}$  are continuous  
[C] If there are surface charges present on the boundary then normal component of  $\vec{D}$  is continuous [D] If there are no surface charges then normal component of  $\vec{D}$  is discontinuous
- 323) The input impedance of short circuited lossless line of length less than a quarter wavelength is ISRO-2008( )
- [A] Purely resistive [B] Purely inductive  
[C] Purely capacitive [D] Complex

324) The intrinsic impedance of free space is  $377 \Omega$ . The approximate intrinsic impedance of a medium with relative permittivity and permeability of 4 and 1 respectively will be

ISRO-2008( )

- [A]  $75 \Omega$  [B]  $94 \Omega$   
 [C]  $188 \Omega$  [D]  $377 \Omega$

325) A 8 kHz communication channel has an SNR of 30 dB. If the channel bandwidth is doubled, keeping the signal power constant, the SNR for the modified channel will be

ISRO-2008( )

- [A] 27 dB [B] 30 dB  
 [C] 33 dB [D] 60 dB

326) Two orthogonal signals  $s_1(t)$  and  $s_2(t)$  satisfy the following relation

ISRO-2008( )

- [A]  $\int_0^T s_1(t) s_2(t) dt = 0$  [B]  $\int_0^T s_1(t) s_2(t) dt = 1$   
 [C]  $\int_0^T s_1(t) s_2(t) dt = \infty$  [D]  $\int_0^T s_1(t) s_2(t) dt = \pi$

327) In which modulation system, when modulating frequency is doubled, the modulation index also becomes double

ISRO-2008( )

- [A] AM [B] FM  
 [C] PM [D] None of the above

328) The matrix  $A = \begin{bmatrix} -4 & -3 & -3 \\ 1 & 0 & 1 \\ 4 & 4 & x \end{bmatrix}$  is its own adjoint. The value of x will be

ISRO-2008( )

- [A] 5 [B] 3  
 [C] -3 [D] -5

329) With a fixed value capacitor C and variable voltage V across it, the energy stored in the capacitor is

ISRO-2007( )

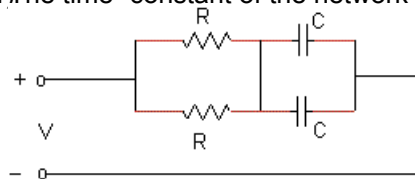
- [A]  $CV^2$  [B]  $0.5 CV^2$   
 [C]  $2 CV^2$  [D] CV

330) A dc voltage V is applied to a series RL circuit. The steady state current is

ISRO-2007( )

- [A]  $V/R$  [B]  $V/L$   
 [C]  $\frac{V}{\sqrt{R^2 + L^2}}$  [D] zero

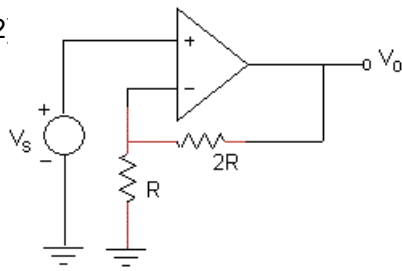
331) The time-constant of the network shown in the figure is



ISRO-2007( )

- [A] CR [B]  $2 CR$   
 [C]  $\frac{CR}{4}$  [D]  $\frac{CR}{2}$

332



In the ideal Op-amp circuit shown  $V_o$  is

- [A]  $2V_s$   
 [C]  $3V_s$

- [B]  $-2V_s$   
 [D]  $-3V_s$

ISRO-2007( )

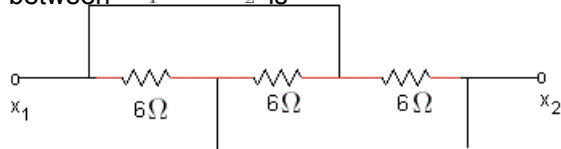
333) If the unit step response of a system is a unit impulse function, then the transfer function of such a system will be

- [A] 1  
 [C] s

- [B]  $1/s$   
 [D]  $\frac{1}{s^2}$

ISRO-2007( )

334) Three resistors of 6 ohms each are connected as shown in the following figure. The equivalent resistance between  $X_1$  and  $X_2$  is

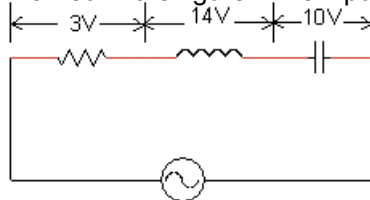


- [A]  $2 \Omega$   
 [C]  $8 \Omega$

- [B]  $4 \Omega$   
 [D]  $12 \Omega$

ISRO-2007( )

335) The source in the circuit shown is a sinusoidal source. The supply voltage across various elements are marked in the figure. The input voltage is



- [A] 10 V  
 [C] 27 V

- [B] 5 V  
 [D] 24 V

ISRO-2007( )

336) Laplace transform of  $e^{-at} f(t)$  is

- [A]  $F(s)e^{-at}$   
 [C]  $F(s+a)$

- [B]  $F(s-a)$   
 [D]  $\frac{F(s)}{s} + a$

ISRO-2007( )

337)  $\cos \theta$  can be represented by

- [A]  $\frac{e^{+i\theta} - e^{-i\theta}}{2}$   
 [C]  $\frac{e^{j\theta} + e^{-i\theta}}{2}$

- [B]  $\frac{e^{+i\theta} - e^{-i\theta}}{2i}$   
 [D]  $\frac{e^{i\theta} + e^{-i\theta}}{2i}$

ISRO-2007( )

338) Of the following transfer function of second order linear time-invariant systems, the underdamped system is represented by

- [A]  $H(s) = \frac{1}{s^2 + 4s + 4}$   
 [C]  $H(s) = \frac{1}{s^2 + 4.5s + 4}$

- [B]  $H(s) = \frac{1}{s^2 + 5s + 4}$   
 [D]  $H(s) = \frac{1}{s^2 + 3s + 4}$

ISRO-2007( )

339) A differential amplifier has a differential gain of 20,000 . CMRR = 80 dB . The common mode gain is given by

ISRO-2007( )

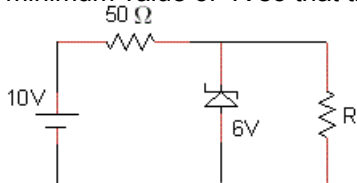
- [A] 2 [B] 1  
 [C] 1/2 [D] 0

340) Two bulbs marked 200 watt - 250 volts and 100 watt - 250 volts are joined in series to 250 volts supply . Power consumed in circuits is

ISRO-2007( )

- [A] 33 watt [B] 67 watt  
 [C] 100 watt [D] 300 watt

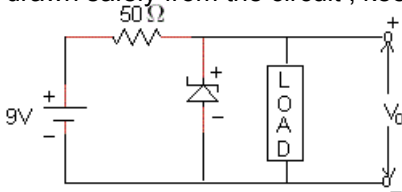
341) The 6V zener diode shown in the figure , has zero zener resistance and a knee current of 5 mA . The minimum value of R so that the voltage across it does not fall below 6V is



ISRO-2007( )

- [A] 1.2 k ohms [B] 80 ohms  
 [C] 50 ohms [D] 0 ohms

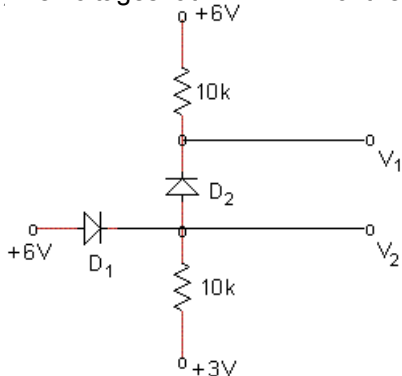
342) A zener diode in the circuit shown in the figure below , has a knee current of 5 mA , and a maximum allowed power dissipation of 330 mW . What are the minimum and maximum load currents that can be drawn safely from the circuit , keeping the output voltage  $V_0$  at 6V ?



ISRO-2007( )

- [A] 0 mA , 180 mA [B] 5 mA , 110 mA  
 [C] 10 mA , 55 mA [D] 60 mA , 180 mA

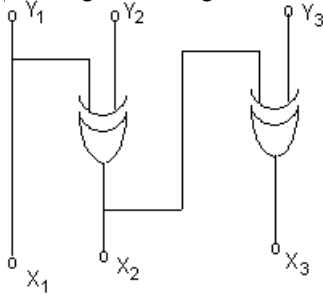
343) The voltages at  $V_1$  and  $V_2$  of the arrangement shown in the figure will be respectively



ISRO-2007( )

- [A] 6 V and 5.4 V [B] 5.4 V and 6 V  
 [C] 3 V and 5.4 V [D] 6 V and 3 V

344) The logic circuit given below converts a binary code  $Y_1Y_2Y_3$  into



- [A] Excess-3 code [B] Gray code  
 [C] BCD code [D] Hamming code

ISRO-2007( )

345) A 4-bit presetable UP counter has present input 0101. The preset operation takes place as soon as the counter reaches 1111. The modulus of the counter is

- [A] 5 [B] 10  
 [C] 11 [D] 15

ISRO-2007( )

346) A 4-bit synchronous counter uses flip-flops with propagation delay time of 25 ns each. The maximum possible time required for change of state will be

- [A] 25 ns [B] 50 ns  
 [C] 75 ns [D] 100 ns

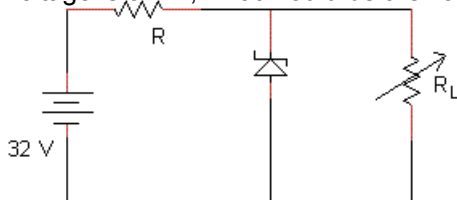
ISRO-2007( )

347) If a counter having 10 FFs is initially at 0, what count will it hold after 2060 Pulses

- [A] 000 000 1100 [B] 000 001 1100  
 [C] 000 001 1000 [D] 000 000 1110

ISRO-2007( )

348) A 24 V, 600 mW, Zener diode is to be used for providing a 24 V stabilized supply to a variable load. Assume that for proper Zener action, a minimum of 10 mA must flow through the Zener. If the input voltage is 32 V, what would be the value of R and the maximum load current?



- [A]  $320 \Omega$ , 10 mA [B]  $400 \Omega$ , 15 mA  
 [C]  $400 \Omega$ , 10 mA [D]  $320 \Omega$ , 15 mA

ISRO-2007( )

349) A half-adder can be constructed using two 2-input logic gates. One of them is an AND-gate, the other is

- [A] OR [B] NAND  
 [C] NOR [D] EX-OR

ISRO-2007( )

350) For one of the following conditions, clocked J-K flip-flop can be used as DIVIDE BY 2 circuit where the pulse train to be divided is applied at clock input.

- [A]  $J = 1, K = 1$  and the flip-flop should have active HIGH inputs [B]  $J = 1, K = 1$  and the flip-flop should have active LOW inputs  
 [C]  $J = 0, K = 0$  and the flip-flop should have active HIGH inputs [D]  $J = 1, K = 1$  and the flip-flop should be a negative edge triggered one

ISRO-2007( )

351) Number of comparators needed to build a 6-bit simultaneous A/D converter is

- [A] 63 [B] 64  
 [C] 7 [D] 6

ISRO-2007( )

352) The A/D converter used in a digital voltmeter could be

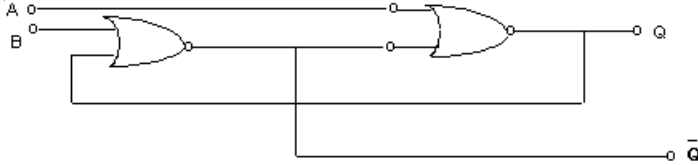
- (1) successive approximation type
- (2) Flash converter type
- (3) Dual slope converter type

The correct sequence in the increasing order of their conversion time taken is

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

ISRO-2007( )

353) The circuit is a



- [A] Monostable MV
- [B] Astable MV
- [C] Adder
- [D] SR FF

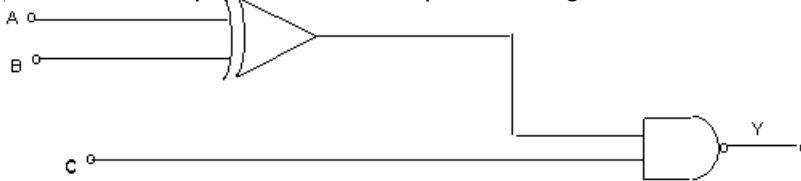
ISRO-2007( )

354) Which of the following binary number is equal to octal number 66.3

- [A] 101101.100
- [B] 1101111.111
- [C] 1111111.1111
- [D] 110110.011

ISRO-2007( )

355) The Boolean expression for the output of the logic circuit shown in the figure is



- [A]  $Y = AB + \overline{AB} + C$
- [B]  $Y = \overline{A}\overline{B} + AB + \overline{C}$
- [C]  $Y = \overline{A}\overline{B} + \overline{A}B + C$
- [D]  $Y = AB + \overline{A}B + \overline{C}$

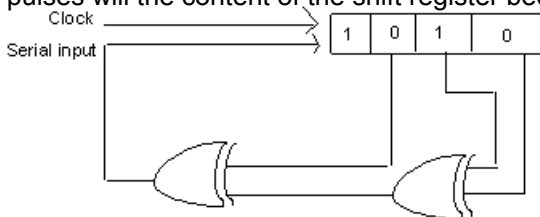
ISRO-2007,ISRO-2007( )

356) For the identity  $AB + \overline{A}C + BC = AB + \overline{A}C$ , the dual form is

- [A]  $(A + B)(\overline{A} + C)(B + C) = (A + B)(\overline{A} + C)(\overline{A} + \overline{B})(\overline{A} + \overline{C})(\overline{B} + \overline{C}) = (\overline{A} + \overline{B})(A + \overline{C})$
- [B]  $(\overline{A} + \overline{B})(\overline{A} + \overline{C})(\overline{B} + \overline{C}) = (\overline{A} + \overline{B})(A + \overline{C})$
- [C]  $(A + B)(\overline{A} + C)(B + C) = (\overline{A} + \overline{B})(A + \overline{C})$
- [D]  $\overline{A}\overline{B} + A\overline{C} + \overline{B}\overline{C} = \overline{A}\overline{B} + A\overline{C}$

ISRO-2007( )

357) The shift register shown in the given figure is initially loaded with the bit pattern 1010. Subsequently the shift register is clocked, and with each clock pulse the pattern gets shifted by one bit position to the right. With each shift, the bit at the serial input is pushed to the left most position (MSB). After how many clock pulses will the content of the shift register becomes 1010 again?

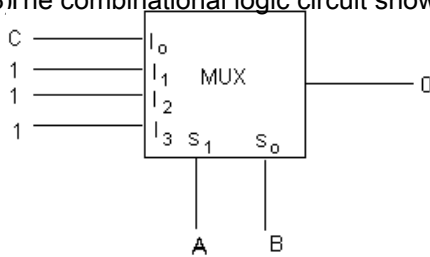


- [A] 3
- [B] 7
- [C] 11
- [D] 15

ISRO-2007( )



358) The combinational logic circuit shown in the given figure has an output Q which is



- [A] ABC  
 [B] A + B + C  
 [C]  $A \oplus B \oplus C$   
 [D] A.B + C

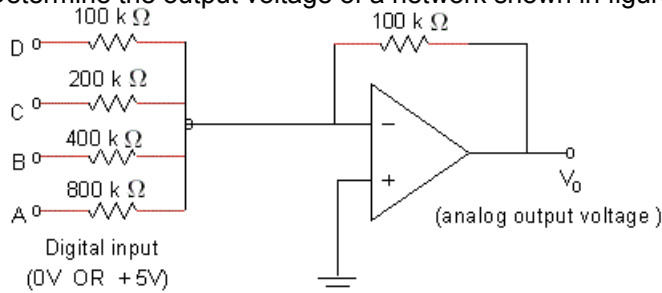
ISRO-2007( )

359) A sample - and - hold (S/H) circuit, having a holding capacitor of 0.1 nF, is used at the input of an ADC (analog-to-digital converter). The conversion time of the ADC is  $1 \mu sec$ , and during this time, the capacitor should not lose more than 0.5% of the charge put across it during the sampling time. The maximum value of the input signal to the S/H circuit is 5V. The leakage current of the S/H circuit should be less than

- [A] 2.5 mA  
 [B] 0.25 mA  
 [C]  $25.0 \mu A$   
 [D]  $2.5 \mu A$

ISRO-2007( )

360) Determine the output voltage of a network shown in figure if the digital input is 1011



- [A] - 3.875 V  
 [B] - 4.875 V  
 [C] - 5.875 V  
 [D] - 6.875 V

ISRO-2007( )

361) A memory system of size 16 K bytes is required to be designed using memory chips, which have 12 address lines and 4 data lines each. The number of such chips required to design a the memory system is

- [A] 2  
 [B] 4  
 [C] 8  
 [D] 16

ISRO-2007( )

362) n time division multiplexing

- [A] Time is doubled between bits of a byte  
 [B] Time slicing at CPU level takes place  
 [C] Total time available in the channel is divided between several users and each users is allotted a time slice  
 [D] None of the above

ISRO-2007( )

363) When a program is being executed in an 8085 microprocessor, its Program Counter contains

- [A] The number of instructions in the current program that have already been executed  
 [B] The total number of instructions in the program being executed  
 [C] The memory address of the instruction that is being currently executed  
 [D] The memory address of the instruction that is to be executed next

ISRO-2007( )

364) The sum S of A and B in a half Adder can be implemented by using K NAND gates. The value of K is

- [A] 3  
 [B] 4  
 [C] 5  
 [D] None of these

ISRO-2007( )

- 365) SWR of a transmission line is always ISRO-2007( )
- [A] Less than unity [B] Greater than unity  
[C] Zero [D] infinity
- 366) Wave guide acts like a ISRO-2007( )
- [A] High pass filter [B] Low pass filter  
[C] All pass filter [D] Band reject filter
- 367) The wave length of a 100 MHz electromagnetic wave propagating through a perfect non magnetic dielectric with relative permittivity  $\epsilon_r = 9$  is ISRO-2007( )
- [A] 3 mtrs [B] 3 cms  
[C] 100 cms [D] 10 cms
- 368) TEM mode exists in ISRO-2007( )
- [A] A circular wave guide [B] A rectangular wave guide  
[C] A co-axial cable [D] None of the transmission lines
- 369) If the PRF is 1200 and the pulse width is  $1.5 \mu s$ , the duty cycle will be ISRO-2007( )
- [A] 12.5 percent [B] 8 percent  
[C] 0.18 percent [D] 0.12 percent
- 370) When VSWR is 3, reflection coefficient is : ISRO-2007( )
- [A] 1/2 [B] 1  
[C] 0 [D] 1/4
- 371) Which transmission line is ideal for handling high power ? ISRO-2007( )
- [A] Coaxial line [B] Microstrip  
[C] Strip line [D] Rectangular waveguide
- 372) Noise Figure is defined as ISRO-2007( )
- [A]  $F = \frac{S_i/N_i}{S_0/N_0}$  [B]  $F = \frac{S_0/N_0}{S_i/N_i}$   
[C]  $F = \frac{S_0/N_0}{\sqrt{S_i/N_i}}$  [D]  $F = \frac{S_i/N_i}{\sqrt{S_0/N_0}}$
- 373) Capture effect is a characteristic of ISRO-2007( )
- [A] AM system [B] FM system  
[C] PCM system [D] TDM system
- 374) In a band limited channel higher bit rate can be transmitted with ISRO-2007( )
- [A] BPSK [B] QPSK  
[C] FM [D] FSK
- 375) In a transmission line terminated with a load equal to the characteristic impedance, the reflection coefficient is ISRO-2007( )
- [A] Zero [B] + 1  
[C] - 1 [D] Infinity
- 376) Poynting vector  $P = E \times H$  has the unit ISRO-2007( )
- [A]  $Watts/metre^2$  [B] Watts/metre  
[C] Watts-metre [D]  $Watts - metre^2$

377) If 1 watt of RF power is fed to a directional coupler having 30 dB coupling, the power available at the coupled port is

ISRO-2007( )

- [A] 1/30 W [B] 1/10 W  
 [C] 1/100 W [D] 1/1000 W

378) The following demodulator scheme requires least  $\frac{E_b}{N_0}$

ISRO-2007( )

- [A] BPSK [B] FSK  
 [C] ASK [D] QAM

379) The channel capacity under the Gaussian noise environment for a discrete memoryless channel with a bandwidth of 4 MHz and SNR of 31 is

ISRO-2007( )

- [A] 20 Mbps [B] 4 Mbps  
 [C] 8 Kbps [D] 4 Kbps

380) Satellite channel can be attributed

ISRO-2007( )

- [A] Only bandwidth limited [B] Only power limited  
 [C] Both bandwidth & power limited [D] None of the above

381) A unit vector perpendicular to the vectors  $\hat{a} = 2i - 3j + k$  and  $\hat{b} = i + j - 2k$  is

ISRO-2007( )

- [A]  $\frac{1}{\sqrt{3}}(-i + j + k)$  [B]  $\frac{1}{\sqrt{3}}(i + j - k)$   
 [C]  $\frac{1}{\sqrt{3}}(i + j + k)$  [D]  $(i + j + k)$

382) The region of the z plane for which  $\left| \frac{z-a}{z+a} \right| = 1$  ( $Re\ a \neq 0$ ) is

ISRO-2007( )

- [A] x-axis [B] y-axis  
 [C] The straight line  $z = |a|$  [D] None of the above

383) If  $\alpha, \beta, \gamma$  are the roots of equations  $x^3 + px^2 + qx + p = 0$ , Then the value of  $\tan^{-1}\alpha + \tan^{-1}\beta + \tan^{-1}\gamma$  is

ISRO-2007( )

- [A]  $n\pi/2$  [B]  $n\pi$   
 [C]  $2n\pi$  [D]  $n\pi/4$

384) The value of the determinant  $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$  is

ISRO-2007( )

- [A] 0 [B] 1  
 [C]  $(a + b + c)$  [D] 3

385) The value of  $\int_0^1 \int_0^1 \frac{dx dy}{\sqrt{(1-x^2)(1-y^2)}}$  is

ISRO-2007( )

- [A]  $\pi^2$  [B]  $\frac{\pi}{4}$   
 [C]  $\frac{2\pi^2}{4}$  [D]  $\frac{\pi}{2}$

386) Solution of  $(D^2 + 16)y = \cos 4x$ , is

ISRO-2007( )

[A]  $y = A \cos 4x + B \sin 4x + \frac{1}{8} \cos 4x$   
 [C]  $y = A \cos 4x + B \sin 4x + \frac{1}{8} \sin 4x$

[B]  $y = A \cos 4x + B \sin 4x + \frac{x}{8} \sin 4x$   
 [D]  $y = A \cos 4x + B \sin 4x + \frac{x}{8} \cos 4x$

387) Laplace transform of  $t^2 + 2t + 3$  is

[A]  $\frac{-2}{s^3} - \frac{2}{s^2} - \frac{3}{s}$   
 [C]  $\frac{2}{s^3} + \frac{2}{s^2} + \frac{3}{s}$

[B]  $\frac{2}{s^3} + \frac{2}{s^2} - \frac{3}{s}$   
 [D]  $\frac{-2}{s^3} + \frac{2}{s^2} - \frac{3}{s}$

ISRO-2007( )

388) Equation of a straight line passing through the point (-1, 2) and making equal intercepts on the axes is

[A]  $x - y = 1$   
 [C]  $x + y = 1$

[B]  $x - 2y = 1$   
 [D]  $x - y = 2$

ISRO-2007( )

389) A bag contains eight white and six red marbles . The probability of drawing two marbles of same colour is

[A]  $\frac{8c_2 \cdot 6c_2}{14c_2}$   
 [C]  $\frac{8c_2 \cdot 6c_2}{14c_2 \cdot 14c_2}$

[B]  $\frac{8c_2}{14c_2} + \frac{6c_2}{14c_2}$   
 [D]  $\frac{8c_2}{14c_2} + \frac{6c_2}{12c_2}$

ISRO-2007( )

390)

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & -3 & 3 \end{bmatrix}$$

The Algebraic multiplicity of the matrix

is

[A] 1  
 [C] 3

[B] 2  
 [D] 4

ISRO-2007( )

391) The impedance of an inductive reactance varies

[A] Linearly with frequency  
 [C] Exponentially with frequency

[B] Parabolically with frequency  
 [D] Linearly with frequency in an increasing manner

ISRO-2007( )

392) Two resistance  $R_1$  and  $R_2$  give combined resistance of 4.5 ohms when in series and 1 ohm when in parallel . The resistances are

[A] 3 ohms and 6 ohms  
 [C] 1.5 ohms and 3 ohms

[B] 3 ohms and 9 ohms  
 [D] 1.5 ohms and 0.5 ohms

ISRO-2007( )

393) Which of the following bulbs will have the least resistance ?

[A] 220V , 60W  
 [C] 115V , 60W

[B] 220V , 100W  
 [D] 115V , 100W

ISRO-2007( )

394) A resistance of 5 ohms is further drawn so that its length becomes double . Its resistance will now be

[A] 5 ohms  
 [C] 10 ohms

[B] 7.5 ohms  
 [D] 20 ohms

ISRO-2007( )

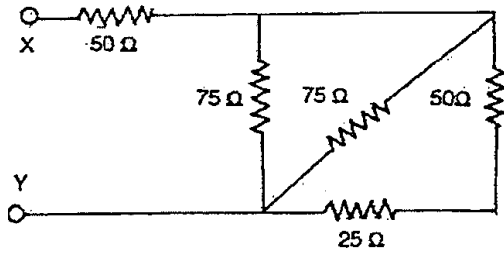
395) The power rating of a 470 ohm resistor carrying a current of 40 mA should be

[A] 1/4 W  
 [C] 2 W

[B] 1/2 W  
 [D] 1 W

ISRO-2007( )

396) Equivalent Resistance between X and Y is



- [A]  $75 \Omega$  [B]  $50 \Omega$   
 [C]  $275 \Omega$  [D] None of above

ISRO-2007( )

397) The open circuit emf of a storage cell is 2.2 volts . The terminal voltage measured when the current is 12A is found to be 1.98 volts . The internal resistance of the cell is

- [A] 0.00183 ohm [B] 0.0183 ohm  
 [C] 0.183 ohm [D] 1.83 ohm

ISRO-2007( )

398) A capacitor passes a current of 12.6 mA when supplied with 20 V ac with a frequency of 1 kHz . The capacitance of the capacitor is

- [A]  $0.1 \mu F$  [B] 0.1 pF  
 [C]  $1 \mu F$  [D] 1 F

ISRO-2007( )

399) The system response can be tested better with

- [A] Sinusoidal input signal [B] Unit impulse input signal  
 [C] Ramp input signal [D] Exponentially decaying signal

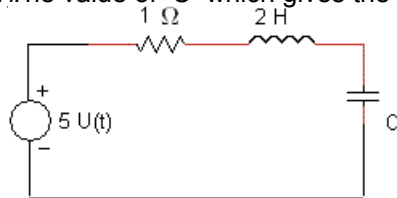
ISRO-2007( )

400) In an ideal op-amp the output impedance is

- [A] 50 ohm [B] 100 ohm  
 [C] Infinite [D] Zero

ISRO-2007( )

401) The value of C which gives the critical damping in the given circuit is



- [A] 2F [B] 4F  
 [C] 8F [D] 1F

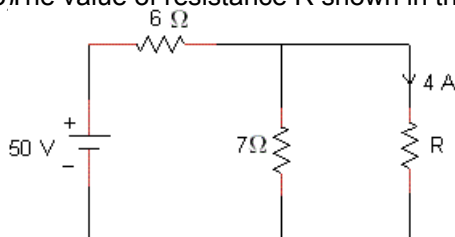
ISRO-2006( )

402) A series RLC circuit resonates at 3 MHz and has 3-dB bandwidth of 10 kHz . The Q of the circuit at resonance

- [A] 30 [B]  $\frac{300}{\sqrt{2}}$   
 [C] 300 [D]  $300\sqrt{2}$

ISRO-2006( )

403) The value of resistance R shown in the given figure is



ISRO-2006( )

[A]  $3.5 \Omega$

[B]  $2.5 \Omega$

[C]  $1 \Omega$

[D]  $4.5 \Omega$

404) At 3 -dB frequencies , current in the series RLC circuit equal current at resonance multiplied by

ISRO-2006( )

[A]  $1/2$

[B]  $\frac{1}{\sqrt{2}}$

[C]  $1/4$

[D]  $\frac{1}{2\sqrt{2}}$

405) A series RLC circuit resonates at 1000 kHz . At frequency of 995 kHz , the circuit impedance is

ISRO-2006( )

[A] Resistive

[B] minimum

[C] Inductive

[D] capacitive

406) If each stage had gain of 10 dB and noise figure of 10 dB , then the overall noise figure of two-stage cascade amplifier will be

ISRO-2006( )

[A] 10

[B] 1.09

[C] 1.0

[D] 10.9

407) In Sigma delta ADC , high bit accuracy is achieved by

ISRO-2006( )

[A] Over sampling and noise shaping

[B] Over sampling

[C] Under sampling

[D] None of the above

408)

Let  $s(t)$  denote the delta function . The value of the integral  $\int_{-a}^a \delta(t) \cos\left(\frac{3t}{2}\right) dt$  is

ISRO-2006( )

[A] 1

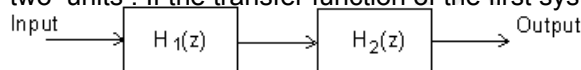
[B] - 1

[C] 0

[D]  $\pi/2$

409) Consider the compound system shown in the above figure . Its output is equal to the input with a delay of

two units . If the transfer function of the first system is given by  $H_1(Z) = \frac{Z - 0.5}{Z - 0.8}$  , then the



ISRO-2006( )

[A]  $H_2(Z) = \frac{Z^{-2} - 0.2Z^{-3}}{1 - 0.4Z^{-1}}$

[B]  $H_2(Z) = \frac{Z^{-2} - 0.8Z^{-3}}{1 - 0.5Z^{-1}}$

[C]  $H_2(Z) = \frac{Z^{-1} - 0.2Z^{-3}}{1 - 0.4Z^{-1}}$

[D]  $H_2(Z) = \frac{Z^{-1} - 0.8Z^{-3}}{1 - 0.5Z^{-1}}$

410) The Z-transform of the signal

$$x(n) = \begin{cases} 1, n = -1 \\ 2, n = 0 \\ -1, n = 1 \\ 1, n = 2 \\ 0, otherwise \end{cases}$$

ISRO-2006( )

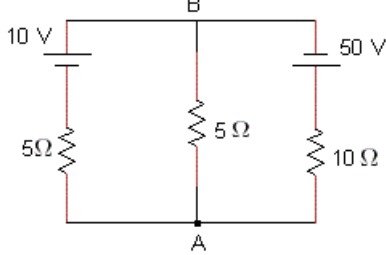
[A]  $z + 2 - z^{-1} + z^{-2}$

[B]  $z^{-1} + 2 - z + z^2$

[C]  $z + 2z^2 - z^{-1} + z^{-2}$

[D]  $z + 2 - z^{+1} + z^{-2}$

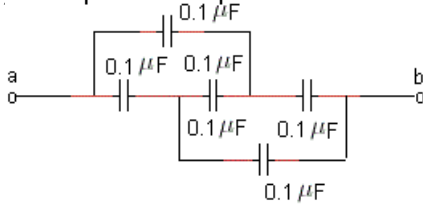
411) For the circuit shown in the given figure, the voltage  $V_{AB}$  is



- [A] 6 V [B] 10 V  
 [C] 25 V [D] 40 V

ISRO-2006( )

412) The equivalent capacitance across 'ab' will be



- [A]  $0.2 \mu F$  [B]  $0.1 \mu F$   
 [C]  $0.5 \mu F$  [D] 0

ISRO-2006( )

413) The transfer function,  $T(s) = \frac{s}{s+a}$  is that of a

- [A] Low-pass filter [B] Notch filter  
 [C] High-pass filter [D] Band-pass filter

ISRO-2006( )

414) A particular current is made up of two components: a 10 A dc and a sinusoidal current of peak value of 1.414 A. The average value of the resultant current is

- [A] Zero [B] 24.14 A  
 [C] 10 A [D] 14.14 A

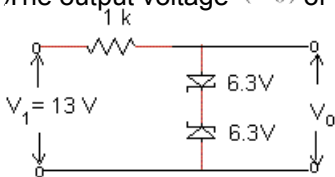
ISRO-2006( )

415) By doubling the sampling frequency

- [A] Quantisation noise decreases by 3 dB [B] Quantisation noise density decreases by 3 dB  
 [C] Quantisation noise increases by 3 dB [D] Quantisation noise density increases by 3 dB

ISRO-2006( )

416) The output voltage ( $V_0$ ) of the circuit shown in the given figure is



- [A] Zero [B] 5.7 V  
 [C] 6.9 V [D] 12.6 V

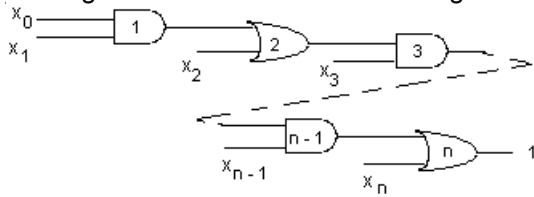
ISRO-2006( )

417) Assuming that only the X and Y logic inputs are available and their complements  $\bar{X}$  and  $\bar{Y}$  are not available, what is the minimum number of two-input NAND gates required to implement  $X \oplus Y$ ?

- [A] 2 [B] 3  
 [C] 4 [D] 5

ISRO-2006( )

418) In the given network of AND and OR gates f can be written as :



- [A]  $X_0 X_1 X_2 \dots X_n + X_1 X_2 \dots X_n + X_2 X_3 \dots X_n + \dots + X_{n-1} X_n$  ISRO-2006( )  
 [B]  $X_0 X_1 X_2 + X_3 + \dots + X_{n-1} X_n$   
 [C]  $X_0 + X_1 + X_2 + \dots + X_n$   
 [D]  $X_0 X_1 X_3 \dots X_{n-1} + X_2 + X_3 + X_5 \dots X_{n-1} + X_{n-1} + X_n$

419) A Pulse train with a frequency of 1 MHz is counted using a modulo 1024 ripple-counter built with J-K flip-flops . For proper operation of the counter the maximum permissible propagation delay per flip-flop stage is

- [A] 100 n sec [B] 50 n sec  
 [C] 20 n sec [D] 10 n sec

ISRO-2006( )

420) The A/D converter used in a digital voltmeter could be

- (1) Successive approximation type
- (2) Flash converter type
- (3) Dual slope converter type .

The correct sequence in the increasing order of their conversion times is

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

ISRO-2006( )

421) The resolution of a D/A converter is approximately 0.4 % of its full-scale range . It is

- [A] An 8-bit converter [B] A 10-bit converter  
 [C] A 12-bit converter [D] A 16-bit converter

ISRO-2006( )

422) In a microprocessor , the register which holds the address of the next instruction to be fetched is

- [A] Accumulator [B] Program counter  
 [C] Stack pointer [D] Instruction register

ISRO-2006( )

423) In microcomputer , WAIT states are used to

- [A] Make the processor wait during a DMA operation [B] Make the processor wait during a power interrupt processing  
 [C] Make the processor wait during a power shutdown [D] Interface slow peripherals to the processor

ISRO-2006( )

424) Which of the following statements are correct

1. A flip-flop is used to store 1-bit of information
2. Race-around condition occurs in a J-K flip-flop when both the inputs are 1
3. Master-slave configuration is used in flip-flops to store 2-bits of information
4. A transparent latch consists of a D-type flip-flop

- [A] 1, 2 and 3 [B] 1, 3 and 4  
 [C] 1, 2 and 4 [D] 2, 3 and 4

ISRO-2006( )

425) How many 1 ' s are present in the binary representation of  $3 \times 512 + 7 \times 64 + 5 \times 8 + 3$  ?

- [A] 8 [B] 9  
 [C] 10 [D] 11

ISRO-2006( )

426) For emitter -coupled logic , the switching speed is very high because

ISRO-2006( )



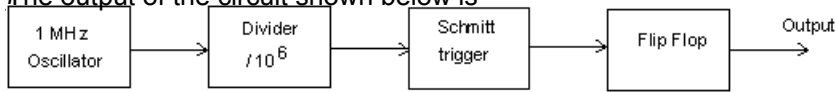
[A] Negative logic is used

[B] The transistors are not saturated when conducting

[C] Emitter-coupled transistors are used

[D] Multi-emitter transistors are used

427) The output of the circuit shown below is



ISRO-2006( )

[A] A pulse train of duration 0.5 sec

[B] A pulse train of duration 2 sec

[C] A pulse train of duration 1 sec

[D] A pulse train of duration 5 sec

428) Gray code for number 7 is

ISRO-2006( )

[A] 1100

[B] 1001

[C] 0110

[D] 0100

429) 10-bit A/D converters, the quantization error is given by (in percent)

ISRO-2006( )

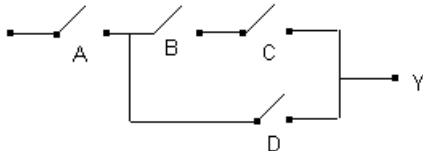
[A] 1

[B] 2

[C] 0.1

[D] 0.2

430) For the switch circuit, taking open as 0 and closed as 1, the expression for the circuit is Y.



ISRO-2006( )

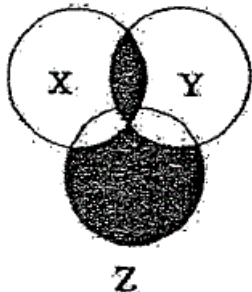
[A]  $A + (B + C)D$

[B]  $A + BC + D$

[C]  $A(BC + D)$

[D] None of these

431) The Boolean expression for the shaded area in the Venn diagram is



ISRO-2006( )

[A]  $\bar{X} + \bar{Y} + Z$

[B]  $\bar{X}\bar{Y}Z + \bar{X}YZ$

[C]  $X + Y + Z$

[D]  $\bar{X}\bar{Y}Z + XY$

432) If the memory chip size is  $256 \times 1$  bits, then the number of chips required to make up 1K bytes of memory is

ISRO-2006( )

[A] 32

[B] 24

[C] 12

[D] 8

433) Given the decimal number -19, an eight bit two's complement representation is given by

ISRO-2006( )

[A] 11101110

[B] 11101101

[C] 11101100

[D] None of these

434) The function shown in the figure when simplified will yield a result with

|    |    |    |    |    |
|----|----|----|----|----|
|    | AB |    |    |    |
| CD | 00 | 01 | 11 | 10 |
| 00 | 1  | 0  | 1  | 0  |
| 01 | 0  | 1  | 0  | 0  |
| 11 | 1  | 0  | 1  | 0  |
| 10 | 0  | 1  | 0  | 1  |

[A] 2 terms

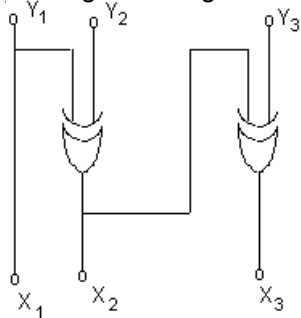
[B] 4 terms

[C] 7 terms

[D] 16 terms

ISRO-2006( )

435) The logic circuit given below converts a binary code  $Y_1Y_2Y_3$  into



[A] Excess-3 code

[B] Gray code

[C] BCD code

[D] Hamming code

ISRO-2006( )

436) A 4-bit synchronous counter uses flip-flops with propagation delay time of 25 ns each . The maximum possible time required for change of state will be

[A] 25 ns

[B] 50 ns

[C] 75 ns

[D] 100 ns

ISRO-2006( )

437) An electromagnetic wave incident on a perfect conductor is :

[A] Entirely reflected

[B] Fully transmitted

[C] Partially transmitted

[D] None of these

ISRO-2006( )

438) The characteristic impedance of a lossless transmission line is given by

[A]  $Z = \sqrt{LC}$

[B]  $Z = \sqrt{C/L}$

[C]  $Z = LC$

[D]  $Z = \sqrt{L/C}$

ISRO-2006( )

439) A lossless line of 50 ohms is terminated in a load of 100 ohms resistive . The VSWR is

[A] 1 : 2

[B] 2 : 1

[C] 4 : 1

[D] 1 : 4

ISRO-2006( )

440) Which of the following does not exist in waveguides

[A] TE waves

[B] TM waves

[C] TE waves and TM waves

[D] TEM waves

ISRO-2006( )

441) Two carriers of 2GHz and 4 GHz respectively are frequency modulated by a signal of 10 KHz , such that bandwidth of the FM signal in the two cases are same . The peak deviation in the two cases are in the ratio of

[A] 1 : 8

[B] 1 : 2

[C] 2 : 1

[D] 1 : 1

ISRO-2006( )

442) The bandwidth required for QPSK modulated channel is

- [A] Twice the BW of BPSK  
[C] Equal to FSK
- [B] Equal to BPSK  
[D] Half of the BW of BPSK
- ISRO-2006( )
- 443) Magic T is
- [A] Four part junction  
[C] Three part junction
- [B] Two part junction  
[D] It is not junction
- ISRO-2006( )
- 444) Diplexer is made of
- [A] Only receiver filter  
[C] Only circulator
- [B] Only transmit filter  
[D] Both receive filter and transmit filter
- ISRO-2006( )
- 445) The gain  $G$  of an antenna of effective area  $A$  is given by
- [A]  $G = \frac{4\pi\lambda}{A^2}$   
[C]  $G = \frac{4\pi A}{\lambda^2}$
- [B]  $G = \frac{4\pi A}{\lambda}$   
[D] None
- ISRO-2006( )
- 446) If the short circuit and open circuit impedance of a line are  $5$  and  $20 \Omega$  respectively the characteristic impedance is given by
- [A]  $100 \Omega$   
[C]  $15 \Omega$
- [B]  $10 \Omega$   
[D]  $10000 \Omega$
- ISRO-2006( )
- 447) The input impedance of short circuited line of length  $l$  where  $\lambda/4 < l < \lambda/2$ , is
- [A] Capacitive  
[C] Resistive
- [B] Inductive  
[D] None of these
- ISRO-2006( )
- 448) Maximum coding gain in
- [A] Block Codes  
[C] Turbo Codes
- [B] Convolution codes  
[D] RS Codes
- ISRO-2006( )
- 449) Noise figure of an amplifier depends on
- [A] Bandwidth  
[C] Power input
- [B] Output Power  
[D] None of the above
- ISRO-2006( )
- 450) BCH code belongs to
- [A] Block Codes  
[C] Turbo Codes
- [B] Convolution Codes  
[D] None of the above
- ISRO-2006( )
- 451) When a carrier is phase modulated, with an integrated modulating signal, the resultant is
- [A] Phase modulated signal  
[C] Amplitude modulated signal
- [B] Frequency modulated signal  
[D] QPSK modulated signal
- ISRO-2006( )
- 452) A satellite orbiting in  $600$  km orbit transmits  $5$  GHz frequency. The Doppler shift observed at the ground station, when the satellite is over head of the station is
- [A] Zero  
[C] Infinity
- [B] Maximum  
[D] None of the above
- ISRO-2006( )
- 453) A communication channel disturbed by additive white Gaussian noise has a bandwidth of  $4$  kHz and SNR of  $15$ . The highest transmission rate that such a channel can support (in k-bits/sec) is
- [A]  $16$   
[C]  $3.2$
- [B]  $1.6$   
[D]  $60$
- ISRO-2006( )

- 454) A dual directional coupler is connected in a microwave reflectometer measurement setup . The reading of the power meter in the forward direction is 100 mw and in the reverse direction 4 mw . The VSWR is ISRO-2006( )
- [A] 4 [B] 0.4  
 [C] 1.5 [D] 10
- 455) Linear amplifier with a gain of 30 dB is fed with  $1.0 \mu W$  power , the output power of the amplifier ISRO-2006( )
- [A] 1.0 W [B] 0 dBm  
 [C] 30 dBm [D] - 30 dBm
- 456) 10 Watts RF power is transmitted with a circular polarized antenna having gain of 10 dB . A receiving antenna has vertical polarization . The path loss is 100 dB . The receiving signal is ISRO-2006( )
- [A] - 83 dBW [B] - 80 dBW  
 [C] - 86 dBW [D] + 80 dBW
- 457)  $\vec{p} = 2i - 3j$ ,  $\vec{Q} = -3i + 4j - 2k$ , and  $\vec{R}$  are in equilibrium , if  $\vec{R}$  is ISRO-2006( )
- [A]  $-i - j + 2k$  [B]  $i - j + 2k$   
 [C]  $i + j + 2k$  [D]  $i - j - 2k$
- 458) A right body is rotating with constant angular velocity  $\omega$  about a fixed axis , if  $v$  is the velocity of a point of the body , then  $\text{curl } v =$  ISRO-2006( )
- [A]  $\omega$  [B]  $\omega^2$   
 [C]  $2\omega$  [D]  $2\omega^2$
- 459) Laplace transform of  $\sin^3 2t$  is ISRO-2006( )
- [A]  $\frac{24}{(s^2 + 4)(s^2 + 36)}$  [B]  $\frac{1}{(s^2 + 4)(s^2 + 64)}$   
 [C]  $\frac{48}{(s^2 + 4)(s^2 + 36)}$  [D]  $\frac{64}{(s^2 + 4)(s^2 + 36)}$
- 460) The value of the determinant  $\begin{vmatrix} \cos \theta & 0 & \sin \theta \\ 0 & 1 & 0 \\ -\sin \theta & 0 & \cos \theta \end{vmatrix}$  is ISRO-2006( )
- [A] 0 [B] - 1  
 [C] 1 [D] 2
- 461) Solution of  $(D^2 + 4)y = \sin^2 x$ , is ISRO-2006( )
- [A]  $y = A \cos 2x + B \sin 2x - \frac{1}{8} - \frac{x}{8} \sin 2x$  [B]  $y = A \cos 2x + B \sin 2x + \frac{1}{8} + \frac{x}{8} \sin 2x$   
 [C]  $y = A \cos 2x + B \sin 2x - \frac{1}{8} + \frac{x}{8} \sin 2x$  [D]  $y = A \cos 2x + B \sin 2x + \frac{1}{8} - \frac{x}{8} \sin 2x$
- 462) The value of k for which the lines  $2x + y - 1 = 0$ ,  $4x + 3y - 3 = 0$  and  $3x + ky - 2 = 0$ , are concurrent is ISRO-2006( )
- [A] - 2 [B] 3  
 [C] 2 [D] - 3
- 463) A box contains 5 black and 5 red balls . Two balls are randomly picked one after another from the box, without replacement . The probability for both balls being red is ISRO-2006( )
- [A] 1/90 [B] 1/5  
 [C] 19/90 [D] 2/9
- 464)  $x^3 + x \sin x$  is

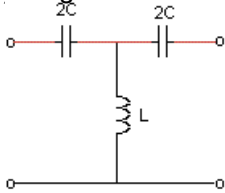
- 465)  $\int \frac{dx}{x\sqrt{x^2 - a^2}}$  is
- [A] Constant function  
 [C] Even function
- [B] Odd function  
 [D] Periodic function
- 466) Eigen values of  $\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$  are
- [A]  $\frac{1}{a} \operatorname{cosec}^{-1}\left(\frac{x}{a}\right)$   
 [C]  $\frac{1}{a} \cos^{-1}\left(\frac{x}{a}\right)$
- [B]  $\frac{1}{a} \sin^{-1}\left(\frac{x}{a}\right)$   
 [D]  $\frac{1}{a} \sec^{-1}\left(\frac{x}{a}\right)$
- 467) The approximate equivalent resistance at the points  $x_1$  and  $x_2$  in the circuit shown below
- 
- [A]  $60 \Omega$   
 [C]  $80 \Omega$
- [B]  $40 \Omega$   
 [D]  $20 \Omega$
- 468) An inductor supplied with 50 V ac with a frequency of 10 kHz passes a current of 7.96 mA. The value of inductor is
- [A] 1 mH  
 [C] 100 mH
- [B] 10 mH  
 [D] 1 H
- 469) In a capacitor, the electric charge is stored in
- [A] Dielectric  
 [C] Dielectric as well as metal plates
- [B] Metal plates  
 [D] Neither dielectric nor metal plates
- 470) Oscillator requires
- [A] No feedback  
 [C] Positive feedback
- [B] Negative feedback  
 [D] Either positive or negative feedback
- 471) Which loss in a transformer varies significantly with load?
- [A] Hysteresis loss  
 [C] Copper loss
- [B] Eddy current loss  
 [D] Core loss
- 472) The resistance of a parallel circuit consisting of two resistors is  $12 \Omega$ . One of the resistance wires breaks and the effective resistance becomes  $18 \Omega$ . The resistance of the broken wire is
- [A]  $48 \Omega$   
 [C]  $36 \Omega$
- [B]  $18 \Omega$   
 [D]  $24 \Omega$
- 473) Time constant of a series R-L circuit equals
- [A]  $L/R$  second  
 [C]  $L^2 R$
- [B]  $LR$  second  
 [D]  $LR^2$
- 474) A dc voltage V is applied at time  $t = 0$  to a series RC circuit. The steady state current is

[A]  $\frac{V}{R}$   
 [C]  $\frac{V}{\sqrt{R^2 + C^2}}$

[B]  $\frac{V}{C}$   
 [D] Zero

ISRO-2006( )

475) The given circuit represents a

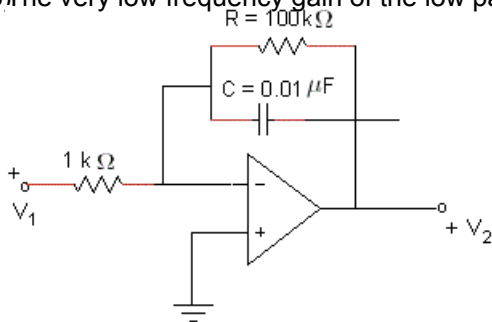


- [A] Low pass filter  
 [C] Band pass filter

- [B] High pass filter  
 [D] Band stop filter

ISRO-2006( )

476) The very low frequency gain of the low pass filter shown in the given figure is

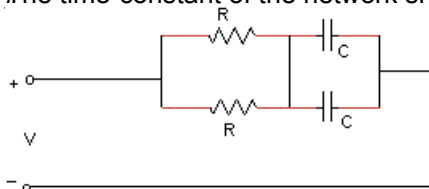


- [A] 10 dB  
 [C] 30 dB

- [B] 20 dB  
 [D] 40 dB

ISRO-2006( )

477) The time-constant of the network shown in the figure is

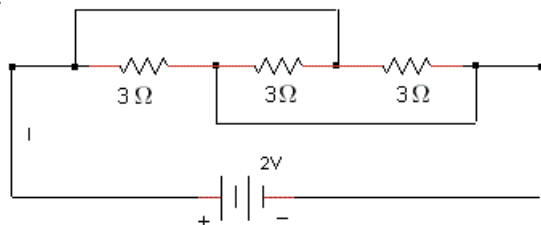


- [A] CR  
 [C] CR / 4

- [B] 2 CR  
 [D] CR / 2

ISRO-2006( )

478) For the circuit shown below the current I flowing through the circuit will be



- [A] 1/2 A  
 [C] 2 A

- [B] 1 A  
 [D] 4 A

ISRO-2006( )

479) When L is doubled and C is halved, the resonance frequency of series tuned circuit becomes

- [A] Doubled  
 [C] One quarter

- [B] Halved  
 [D] Unchanged

ISRO-2006( )

480) In a Series resonant circuit , with the increase in L

ISRO-2006( )

[A] Resonant frequency will decrease  
[C] Q will increase

[B] Bandwidth will decrease  
[D] All of these

IES, Bangalore

Key Paper

|      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |      |   |
|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|------|---|
| 1.   | D | 2.   | A | 3.   | C | 4.   | B | 5.   | D | 6.   | B | 7.   | B | 8.   | D | 9.   | B | 10.  | D |
| 11.  | C | 12.  | D | 13.  | C | 14.  | D | 15.  | D | 16.  | D | 17.  | C | 18.  | A | 19.  | B | 20.  | D |
| 21.  | A | 22.  | D | 23.  | C | 24.  | C | 25.  | C | 26.  | D | 27.  | A | 28.  | C | 29.  | C | 30.  | C |
| 31.  | A | 32.  | D | 33.  | C | 34.  | D | 35.  | B | 36.  | C | 37.  | A | 38.  | B | 39.  | B | 40.  | C |
| 41.  | C | 42.  | C | 43.  | B | 44.  | D | 45.  | A | 46.  | A | 47.  | A | 48.  | B | 49.  | C | 50.  | B |
| 51.  | C | 52.  | D | 53.  | D | 54.  | C | 55.  | C | 56.  | A | 57.  | D | 58.  | A | 59.  | A | 60.  | C |
| 61.  | A | 62.  | B | 63.  | B | 64.  | B | 65.  | A | 66.  | A | 67.  | D | 68.  | A | 69.  | A | 70.  | C |
| 71.  | B | 72.  | B | 73.  | B | 74.  | C | 75.  | D | 76.  | C | 77.  | A | 78.  | B | 79.  | A | 80.  | C |
| 81.  | D | 82.  | C | 83.  | D | 84.  | B | 85.  | B | 86.  | D | 87.  | D | 88.  | A | 89.  | C | 90.  | B |
| 91.  | D | 92.  | B | 93.  | A | 94.  | B | 95.  | D | 96.  | A | 97.  | A | 98.  | B | 99.  | D | 100. | B |
| 101. | C | 102. | C | 103. | C | 104. | B | 105. | C | 106. | A | 107. | C | 108. | D | 109. | C | 110. | A |
| 111. | B | 112. | B | 113. | C | 114. | C | 115. | C | 116. | A | 117. | B | 118. | B | 119. | D | 120. | A |
| 121. | B | 122. | A | 123. | A | 124. | D | 125. | C | 126. | C | 127. | C | 128. | D | 129. | B | 130. | D |
| 131. | C | 132. | D | 133. | D | 134. | A | 135. | A | 136. | B | 137. | C | 138. | C | 139. | A | 140. | C |
| 141. | C | 142. | D | 143. | A | 144. | D | 145. | A | 146. | B | 147. | D | 148. | C | 149. | D | 150. | A |
| 151. | B | 152. | A | 153. | D | 154. | C | 155. | A | 156. | C | 157. | B | 158. | B | 159. | B | 160. | C |
| 161. | C | 162. | D | 163. | B | 164. | C | 165. | A | 166. | C | 167. | D | 168. | B | 169. | A | 170. | D |
| 171. | C | 172. | D | 173. | A | 174. | D | 175. | A | 176. | B | 177. | D | 178. | C | 179. | C | 180. | A |
| 181. | D | 182. | B | 183. | B | 184. | A | 185. | D | 186. | C | 187. | A | 188. | C | 189. | A | 190. | A |
| 191. | D | 192. | A | 193. | C | 194. | B | 195. | B | 196. | C | 197. | C | 198. | A | 199. | D | 200. | D |
| 201. | C | 202. | B | 203. | D | 204. | B | 205. | A | 206. | B | 207. | D | 208. | D | 209. | A | 210. | D |
| 211. | D | 212. | B | 213. | A | 214. | C | 215. | B | 216. | B | 217. | A | 218. | D | 219. | B | 220. | D |
| 221. | C | 222. | D | 223. | C | 224. | B | 225. | D | 226. | C | 227. | C | 228. | D | 229. | B | 230. | A |
| 231. | B | 232. | C | 233. | B | 234. | A | 235. | C | 236. | A | 237. | D | 238. | B | 239. | B | 240. | B |
| 241. | A | 242. | D | 243. | D | 244. | B | 245. | A | 246. | A | 247. | C | 248. | C | 249. | B | 250. | D |
| 251. | B | 252. | A | 253. | C | 254. | A | 255. | B | 256. | A | 257. | A | 258. | C | 259. | B | 260. | B |
| 261. | B | 262. | B | 263. | D | 264. | D | 265. | B | 266. | B | 267. | C | 268. | A | 269. | A | 270. | A |
| 271. | C | 272. | B | 273. | D | 274. | B | 275. | B | 276. | C | 277. | C | 278. | D | 279. | C | 280. | D |
| 281. | B | 282. | C | 283. | D | 284. | A | 285. | A | 286. | A | 287. | D | 288. | A | 289. | D | 290. | D |
| 291. | C | 292. | D | 293. | D | 294. | D | 295. | D | 296. | D | 297. | D | 298. | D | 299. | C | 300. | B |
| 301. | A | 302. | D | 303. | B | 304. | C | 305. | D | 306. | D | 307. | C | 308. | A | 309. | A | 310. | D |
| 311. | B | 312. | B | 313. | B | 314. | A | 315. | C | 316. | C | 317. | D | 318. | A | 319. | D | 320. | A |
| 321. | D | 322. | B | 323. | B | 324. | C | 325. | A | 326. | A | 327. | D | 328. | B | 329. | B | 330. | A |
| 331. | A | 332. | C | 333. | C | 334. | A | 335. | B | 336. | C | 337. | C | 338. | D | 339. | A | 340. | B |



|        |        |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| 341. B | 342. C | 343. D | 344. B | 345. B | 346. A | 347. A | 348. D | 349. D | 350. D |
| 351. A | 352. B | 353. D | 354. D | 355. B | 356. B | 357. B | 358. B | 359. D | 360. D |
| 361. C | 362. C | 363. D | 364. C | 365. B | 366. A | 367. C | 368. C | 369. C | 370. A |
| 371. D | 372. A | 373. B | 374. B | 375. A | 376. A | 377. D | 378. A | 379. A | 380. C |
| 381. C | 382. B | 383. B | 384. A | 385. C | 386. B | 387. C | 388. C | 389. B | 390. A |
| 391. D | 392. C | 393. D | 394. C | 395. D | 396. A | 397. B | 398. A | 399. A | 400. D |
| 401. C | 402. C | 403. A | 404. B | 405. D | 406. D | 407. B | 408. A | 409. B | 410. A |
| 411. A | 412. B | 413. C | 414. C | 415. A | 416. C | 417. C | 418. D | 419. A | 420. B |
| 421. A | 422. B | 423. D | 424. C | 425. D | 426. B | 427. B | 428. D | 429. C | 430. C |
| 431. D | 432. A | 433. B | 434. C | 435. B | 436. A | 437. A | 438. D | 439. B | 440. D |
| 441. D | 442. D | 443. A | 444. D | 445. C | 446. B | 447. A | 448. C | 449. D | 450. A |
| 451. B | 452. B | 453. A | 454. C | 455. B | 456. B | 457. B | 458. C | 459. C | 460. C |
| 461. D | 462. C | 463. D | 464. A | 465. D | 466. A | 467. B | 468. C | 469. B | 470. C |
| 471. D | 472. C | 473. A | 474. A | 475. B | 476. D | 477. A | 478. C | 479. D | 480. D |

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