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**LMRC Assistant  
Engineer**  
**Previous Year Paper**  
**(S & T) 28 June 2015**  
**Shift 2**



**Lucknow Metro Rail Corporation Shift 2**

**Notations :**

1. Options shown in **green** color and with  icon are correct.
2. Options shown in **red** color and with  icon are incorrect.

**Question Paper Name:** Assistant Engineer Signalling and Telecommunication Actual Final Shift 2  
**Subject Name:** Assistant Engineer Signalling and Telecommunication  
**Duration:** 90

	Group 1
Group Maximum Duration :	0
Group Minimum Duration :	90
Revisit allowed for view? :	No
Revisit allowed for edit? :	No
Mandatory or Optional:	Technical Mandatory

**Question Number : 1 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

In 8085, which of the following machine cycles are not used in CALL instruction?

**Options :**

1.  I/O
2.  Instruction fetch, Memory write
3.  I/O, Memory Read, Memory Write
4.  Memory Read/Write, Instruction fetch

**Question Number : 2 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

In 8085, if the clock frequency is 6 MHz, the time required to execute an instruction of 18T-states is:

**Options :**

1.  6  $\mu$ s
2.  3  $\mu$ s

3. ✗ 4  $\mu$ s  
4. ✗ 3.6  $\mu$ s

Question Number : 3 Question Type : MCQ

Correct : 1 Wrong : 0.33

An n-bit A/D converter is required to convert analog input in range of 0-5V to an accuracy of 10 mV. The value of 'n' should be:

Options :

1. ✗ 8  
2. ✗ 10  
3. ✗ 16  
4. ✓ 9

Question Number : 4 Question Type : MCQ

Correct : 1 Wrong : 0.33

If  $CS = \bar{A}_{15}A_{14}A_{13}$  is used as chip select logic of 4K RAM in an 8085 system, then its memory range will be

Options :

1. ✗ 3000 H - 3FFF H  
2. ✓ 6000 H - 6FFF H and 7000 H - 7FFF H  
3. ✗ 7000 H - 7FFF H  
4. ✗ 5000 H - 5FFF H and 6000 H - 6FFF H

Question Number : 5 Question Type : MCQ

Correct : 1 Wrong : 0.33

A modulo - 8 counter requires how many number of flip-flop?

Options :

1. ✓ 3  
2. ✗ 4  
3. ✗ 8  
4. ✗ 5



Question Number : 6 Question Type : MCQ

Correct : 1 Wrong : 0.33

$F = v + \bar{v}w + \bar{v}\bar{w}x + \bar{v}\bar{w}\bar{x}y + \bar{v}\bar{w}\bar{x}\bar{y}z$ , where minimized boolean function F is

Options :

1. ✗  $vwx\bar{y}z$   
2. ✓  $v + w + x + y + z$   
3. ✗ 1  
4. ✗ 0

Question Number : 7 Question Type : MCQ

Correct : 1 Wrong : 0.33

By using only 4 : 1 MUX, it is possible to realize:

Options :

1. ✘ any 3 variable function
2. ✘ only 2 variable function
3. ✘ any 2 and 3 variable function
4. ✓ few 3 variable functions

Question Number : 8 Question Type : MCQ

Correct : 1 Wrong : 0.33

Minimum number of NAND gates required to implement sum in half adder circuit is:

Options :

1. ✓ 4
2. ✘ 3
3. ✘ 2
4. ✘ 5

Question Number : 9 Question Type : MCQ

Correct : 1 Wrong : 0.33

For a 5 stage ring oscillator, if the propagation delay of each inverter is 100 pico seconds, then what is the fundamental frequency of the oscillator output?

Options :

1. ✘ 2 GHz
2. ✘ 100 MHz
3. ✓ 1 GHz
4. ✘ 10 MHz

Question Number : 10 Question Type : MCQ

Correct : 1 Wrong : 0.33

**Assertion (A):** Emitter coupled logic (ECL) provides high speed logic gates.

**Reason (R):** ECL does not operate in full saturated or cut off, so it prevents adverse effects of diffusion capacitance

Which of the following is correct?

Options :

1. ✓ Both A and R are true, and R is the correct explanation of A.
2. ✘ Both A and R are true, but R is not a correct explanation of A.
3. ✘ A is true but R is false.
4. ✘ A is false but R is true.

Question Number : 11 Question Type : MCQ

Correct : 1 Wrong : 0.33

For a distortionless LTI system:

Options :

1. ✓ group delay = Phase delay
2. ✗ group delay > Phase delay
3. ✗ group delay < Phase delay
4. ✗  $\text{group delay} = \frac{\text{Phase delay}}{2}$

Question Number : 12 Question Type : MCQ

Correct : 1 Wrong : 0.33

The convolution of signal  $y(t) = \exp(-t^2) * (2t^2)$  is equal to:

Options :

1. ✗  $\sqrt{\pi}(t^2 + 1)$
2. ✗  $\left(t^2\sqrt{\pi} + \frac{\sqrt{\pi}}{2}\right)$
3. ✗  $2\sqrt{\pi}\left(t + \frac{1}{2}\right)$
4. ✓  $2\sqrt{\pi}\left(t^2 + \frac{1}{2}\right)$

Question Number : 13 Question Type : MCQ

Correct : 1 Wrong : 0.33

What do we call the relation between autocorrelation and power spectral density?

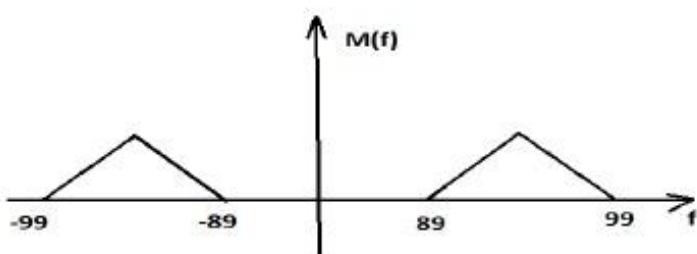
Options :

1. ✗ Einstein Theorem
2. ✗ Weiner Theorem
3. ✓ Weiner – Khintchin Theorem
4. ✗ no relation exist

Question Number : 14 Question Type : MCQ

Correct : 1 Wrong : 0.33

What is the nyquist rate and minimum sampling rate of the signal  $m(t)$ , ( $m(t) \rightleftharpoons M(f)$ ) where spectrum of bandpass signal in KHz is as given below?



Options :

20 KHz and 2 KHz

1. ✗ 20 KHz and 2 KHz
2. ✓ 198 KHz and 22 KHz
3. ✗ 198 KHz and 2 KHz
4. ✗ 178 KHz and 20 KHz

Question Number : 15 Question Type : MCQ

Correct : 1 Wrong : 0.33

For given  $x(n)$ ,  $X(e^{j\omega})$  is the discrete time fourier transform. If  $x(n) = \left(\frac{1}{2}\right)^n u(n)$  and  $y(n) = x^2(n)$ , then the value of  $Y(e^{j0})$  is:

Options :

1. ✗  $\frac{1}{4}$
2. ✗ 2
3. ✗ 4
4. ✓  $\frac{4}{3}$

Question Number : 16 Question Type : MCQ

Correct : 1 Wrong : 0.33

The Laplace transform of  $x(t) = -e^{2t}u(t) * tu(t)$  is:

Options :

1. ✓  $-\frac{1}{s^2(s-2)}$
2. ✗  $\frac{-1}{s(s-2)}$
3. ✗  $\frac{1}{s^2(s-2)}$
4. ✗  $-\frac{1}{s^2(s+2)}$

Question Number : 17 Question Type : MCQ

Correct : 1 Wrong : 0.33

It is given that  $x(n) = \{1, -1, 2, 0, 3, -2\}$ .



What is the energy of signal  $y(n)$ , where  $y(n) = x(2n)$ ?

Options :

1. ✗ 19
2. ✓ 14

3. ✘ 10

4. ✘ 13

Question Number : 18 Question Type : MCQ

Correct : 1 Wrong : 0.33

If the fourier transform of  $f(t)$  is  $F(j\omega)$ , then what is the fourier transform of  $f(-t)$ ?

Options :

1. ✘  $F(j\omega)$

2. ✓  $F(-j\omega)$

3. ✘  $-F(-j\omega)$

4. ✘  $F^*(j\omega)$

Question Number : 19 Question Type : MCQ

Correct : 1 Wrong : 0.33

Which of the following functions has unity as its Fourier transform, Laplace transform and Z – transform?

Options :

1. ✓ impulse

2. ✘ gaussian

3. ✘ Sinc

4. ✘ pulse

Question Number : 20 Question Type : MCQ

Correct : 1 Wrong : 0.33

A discrete LTI system is non causal if its impulse response is:

Options :

1. ✘  $a^{n+2} u(n)$

2. ✘  $a^n u(n-2)$

3. ✓  $a^n u(n+2)$

4. ✘  $a^{n-2} u(n)$

Question Number : 21 Question Type : MCQ

Correct : 1 Wrong : 0.33

Which dirichlet's condition(s) is/are related to fourier transform?

- I. Function is absolutely integrable
- II. Function must have finite extrema
- III. Function has finite discontinuities

Options :

1. ✘ Only I
2. ✘ Only II
3. ✘ Only III
4. ✓ All three

Question Number : 22 Question Type : MCQ

Correct : 1 Wrong : 0.33

When impulse response of a system  $c(t)$  is given by  $\frac{1}{2} e^{-t/2}$ , the unit step response of the system is:

Options :

1. ✓  $1 - e^{-t/2}$
2. ✘  $2 - e^{-2t}$
3. ✘  $1 - e^{-t}$
4. ✘  $1 - e^{-2t}$

Question Number : 23 Question Type : MCQ

Correct : 1 Wrong : 0.33

If the magnitude of polar plot at phase crossover is 'a', the gain margin is:

Options :

1. ✘  $-a$
2. ✘ 0
3. ✘  $a$
4. ✓  $\frac{1}{a}$

Question Number : 24 Question Type : MCQ

Correct : 1 Wrong : 0.33

As compared to closed loop system, an open loop is

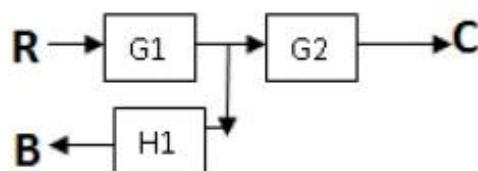
Options :

1. ✘ more stable as well as more accurate
2. ✘ less stable as well as less accurate
3. ✓ more stable but less accurate
4. ✘ less stable but more accurate

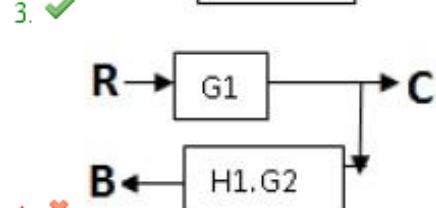
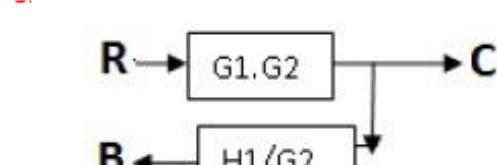
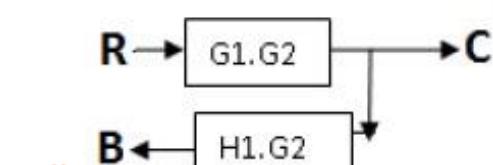
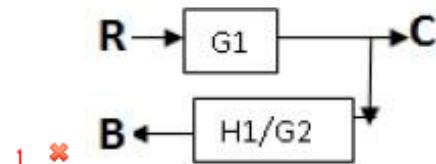
Question Number : 25 Question Type : MCQ

Correct : 1 Wrong : 0.33

The equivalent of the block diagram in the given figure is (all notations have their usual meanings):



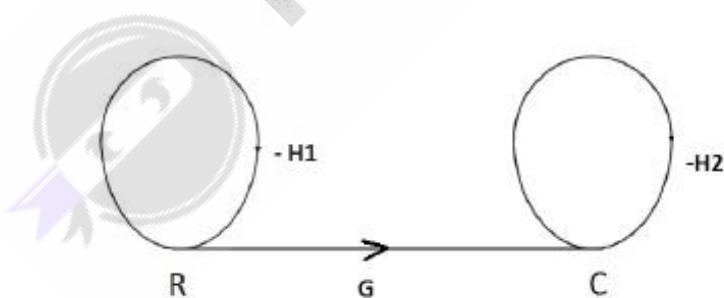
Options :



Question Number : 26 Question Type : MCQ

Correct : 1 Wrong : 0.33

Calculate the transfer function  $\frac{C}{R}$  for the given signal flow graph shown below.



Options :

1. ✗ 
$$\frac{G}{1+H1}$$

2. ✓ 
$$\frac{G}{1+H2}$$

3. ✗ 
$$\frac{G}{(1+H1)(1+H2)}$$

4. ✗ 
$$\frac{G}{1+H1+H2}$$

Question Number : 27 Question Type : MCQ

Correct : 1 Wrong : 0.33

Find the range of K such that the system is stable when characteristic equation of system is  $S^4 + S^3 + KS^2 + S + 1$ .

Options :

1. ✗  $K > 1$
2. ✓  $K > 2$
3. ✗  $K > 3$
4. ✗  $K > 4$

Question Number : 28 Question Type : MCQ

Correct : 1 Wrong : 0.33

The transfer function is  $\frac{1+0.5s}{1+s}$ . It represents a:

Options :

1. ✗ Lag -lead network
2. ✓ Lag network
3. ✗ Lead network
4. ✗ Proportional network

Question Number : 29 Question Type : MCQ

Correct : 1 Wrong : 0.33

The Bode plot is valid for:

Options :

1. ✓ minimum phase network
2. ✗ all phase network
3. ✗ non minimum phase network
4. ✗ both all phase and non minimum phase network

Question Number : 30 Question Type : MCQ

Correct : 1 Wrong : 0.33

The steady state error of a stable type- zero unity- feedback system for unit step function is:

Options :

1. ✗  $\infty$
2. ✗ 0
3. ✗  $\frac{1}{K_p}$

4.   $\frac{1}{1+K_p}$

Question Number : 31 Question Type : MCQ

Correct : 1 Wrong : 0.33

A coil of resistance  $20 \Omega$  and inductance  $0.8 \text{ H}$  is connected to  $200\text{V}$  DC supply. The rate of change of current at  $t = 0^+$  is:

Options :

1.   $16 \text{ A/s}$
2.   $160 \text{ A/s}$
3.   $250 \text{ A/s}$
4.   $4000 \text{ A/s}$

Question Number : 32 Question Type : MCQ

Correct : 1 Wrong : 0.33

What is the value of  $R_s$  required to self bias N- channel JFET with  $V_p = -10 \text{ V}$ ,  $I_{DSS} = 40 \text{ mA}$  and  $V_{GSQ} = -5 \text{ V}$ ?

Options :

1.   $250 \Omega$
2.   $500 \Omega$
3.   $750 \Omega$
4.   $1500 \Omega$

Question Number : 33 Question Type : MCQ

Correct : 1 Wrong : 0.33

If each branch of a Delta circuit has resistance of  $\sqrt{3} R$ , then each branch of equivalent Wye circuit has a resistance of:

Options :

1.   $3\sqrt{3} R$
2.   $\frac{R}{3}$
3.   $3R$
4.   $\frac{R}{\sqrt{3}}$

Question Number : 34 Question Type : MCQ

Correct : 1 Wrong : 0.33

Superposition theorem is applicable to a linear network in determining

Options :

1.  current and voltage response

2. ✘ current and power response
3. ✘ voltage and power response
4. ✘ current, voltage and power response

Question Number : 35 Question Type : MCQ

Correct : 1 Wrong : 0.33

The maximum power transferred to load when voltage source of 240 V having an internal impedance of  $(3 - 4j)$  is:

Options :

1. ✘ 2.4 KW
2. ✓ 4.8 KW
3. ✘ 3.6 KW
4. ✘ 6 KW

Question Number : 36 Question Type : MCQ

Correct : 1 Wrong : 0.33

What is  $Z_{11}$  of network, when  $A = D = \frac{3}{2} B = \frac{4}{3} C$ , where all notations are as per practice?

Options :

1. ✘  $\frac{5}{3}$
2. ✓  $\frac{4}{3}$
3. ✘  $\frac{2}{3}$
4. ✘  $\frac{1}{3}$

Question Number : 37 Question Type : MCQ

Correct : 1 Wrong : 0.33

When two identical first order low pass filters are cascaded non- interactively, the unit step response of composite filter will be:

Options :

1. ✘ Oscillatory
2. ✘ Overdamped
3. ✓ Critically damped
4. ✘ Underdamped

Question Number : 38 Question Type : MCQ

Correct : 1 Wrong : 0.33

The impedance of parallel RLC network is  $Z(s) = \frac{5s}{s^2 + 0.5s + 100}$ .

The values of R, L and C are respectively:

Options :

1. ✗ 2  $\Omega$ ,  $\frac{1}{20}$  H,  $\frac{1}{5}$  F

2. ✗ 10  $\Omega$ ,  $\frac{1}{20}$  H,  $\frac{1}{2}$  F

3. ✗ 1  $\Omega$ ,  $\frac{1}{2}$  H,  $\frac{1}{5}$  F

4. ✓ 10  $\Omega$ ,  $\frac{1}{20}$  H,  $\frac{1}{5}$  F

Question Number : 39 Question Type : MCQ

Correct : 1 Wrong : 0.33

The impedance matrices of two, two-port networks are  $\begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$  and  $\begin{bmatrix} 15 & 5 \\ 5 & 25 \end{bmatrix}$ .

If these two networks are connected in series, the impedance matrix of the resulting 2 port network will be:

Options :

1. ✗  $\begin{bmatrix} 3 & 5 \\ 2 & 25 \end{bmatrix}$

2. ✓  $\begin{bmatrix} 18 & 7 \\ 7 & 28 \end{bmatrix}$

3. ✗  $\begin{bmatrix} 15 & 2 \\ 5 & 3 \end{bmatrix}$

4. ✗ Indeterminate

Question Number : 40 Question Type : MCQ

Correct : 1 Wrong : 0.33

A network has 4 nodes and 3 independent loops. What is the number of branches in the network?

Options :

1. ✗ 5

2. ✗ 7

3. ✗ 8

4. ✓ 6

Question Number : 41 Question Type : MCQ

Correct : 1 Wrong : 0.33

Which one of the following is not Maxwell's equation?

Options :

1.  $\nabla \times \vec{E} = - \frac{\partial \vec{B}}{\partial t}$

2.  $\nabla \times \vec{H} = \vec{J} + \frac{\partial \vec{D}}{\partial t}$

3.  $\nabla \times \vec{J} = - \frac{\partial \rho}{\partial t}$

4.  $\nabla \cdot \vec{D} = \rho$

Question Number : 42 Question Type : MCQ

Correct : 1 Wrong : 0.33

Assuming that conductivity does not vary with frequency, the ratio of the group and phase velocities of an electromagnetic wave in a non dispersive medium:

Options :

1.  $\times$  is constant, equal to 2

2.  $\times$  depends linearly on frequency

3.  $\times$  is inversely proportional to frequency

4.  $\checkmark$  is constant, equal to 1

Question Number : 43 Question Type : MCQ

Correct : 1 Wrong : 0.33

The characteristic impedance of a certain lossless transmission line is  $72 \Omega$  with inductance per unit length of  $0.5 \mu\text{H/m}$  and load impedance of  $60 \Omega$ . Determine the capacitance per unit length (C), phase velocity (Vp) and SWR:

Options :

1.  $\checkmark$   $C = 96 \text{ pF/m}$ ,  $V_p = 1.4 \times 10^8 \text{ m/s}$ , SWR = 1.2

2.  $\times$   $C = 7.7 \text{ nF/m}$ ,  $V_p = 0.15 \times 10^8 \text{ m/s}$ , SWR = 1.33

3.  $\times$   $C = 2.9 \text{ pF/m}$ ,  $V_p = 8 \times 10^8 \text{ m/s}$ , SWR = 0.84

4.  $\times$   $C = 96 \text{ nF/m}$ ,  $V_p = 14 \times 10^8 \text{ m/s}$ , SWR = 1.20

Question Number : 44 Question Type : MCQ

Correct : 1 Wrong : 0.33

Let  $E_s = 400 e^{-j2x} a_y \text{ V/m}$  in free space. Find  $H_s$  and average value of poynting vector (where  $E_s$ ,  $H_s$  are phasor form of electric and magnetic field vector).

Options :

1.   $1.06e^{j2x} a_z \text{ A/m}$  and  $212a_x \text{ W/m}^2$   
 2.   $-1.06e^{j2x} a_z \text{ A/m}$  and  $424a_x \text{ W/m}^2$   
 3.   $1.06e^{-j2x} a_z \text{ A/m}$  and  $212a_x \text{ W/m}^2$   
 4.   $-1.06e^{-j2x} a_z \text{ A/m}$  and  $0.26a_x \text{ W/m}^2$

Question Number : 45 Question Type : MCQ

Correct : 1 Wrong : 0.33

Let vector  $\vec{A} = yz \hat{a}_x + xy \hat{a}_y + xz \hat{a}_z$ . Evaluate  $|\Delta \times \vec{A}|$  at point (5, 4, 5).

Options :

1.  0  
 2.   $\sqrt{2}$   
 3.   $\sqrt{3}$   
 4.   $\sqrt{5}$

Question Number : 46 Question Type : MCQ

Correct : 1 Wrong : 0.33

A rectangular waveguide has  $a = 4 \text{ cm}$  and  $b = 3 \text{ cm}$  as its cross-sectional dimensions.

The number of modes possible for  $f = 5000 \text{ MHz}$  are:

Options :

1.  2  
 2.  3  
 3.  1  
 4.  4

Question Number : 47 Question Type : MCQ

Correct : 1 Wrong : 0.33

On a conduction surface, which of the following conditions is satisfied?

Here  $E$  and  $H$  are electric and magnetic field vectors respectively.

Options :

1.   $E_{\min}$  and  $H_{\max}$   
 2.   $E_{\min}$  and  $H_{\min}$   
 3.   $H_{\max}$  and  $E_{\max}$   
 4.   $E_{\max}$  and  $H_{\max}$

Question Number : 48 Question Type : MCQ

Correct : 1 Wrong : 0.33

The characteristics admittance and load  $Y_L$  of a lossless transmission line is  $20 \text{ mS}$  and  $(40 - j20)$ .  $Y_{in}$  is calculated at length  $L = 0.15\lambda$  with the help of smith chart. Which of the following is correct?

Options :

1. ✓ Rotate  $108^\circ$  clockwise
2. ✗ Rotate  $108^\circ$  counter clockwise
3. ✗ Rotate  $54^\circ$  clockwise
4. ✗ Rotate  $54^\circ$  counter clockwise

Question Number : 49 Question Type : MCQ

Correct : 1 Wrong : 0.33

The directivity of hertzian dipole is:

Options :

1. ✗ 2
2. ✗ 1
3. ✓ 1.5
4. ✗ 2.5

Question Number : 50 Question Type : MCQ

Correct : 1 Wrong : 0.33

The velocity of EM wave in conductor, when skin depth in a good conductor is  $4 \mu\text{m}$  at a frequency of 200 KHz, is:

Options :

1. ✗  $15 \text{ m/s}$
2. ✗  $10 \text{ m/s}$
3. ✗  $3 \times 10^8 \text{ m/s}$
4. ✓  $5 \text{ m/s}$

Question Number : 51 Question Type : MCQ

Correct : 1 Wrong : 0.33

What is the maximum value of resistor when capacitor  $C = 0.1 \mu\text{F}$  and amplitude modulated wave  $s(t) = 20[1 + 0.6 \cos(2\pi \times 10^3 t)]\cos 2\pi \times 10^3 t$  is to be detected by an envelope detector?

Options :

1. ✗  $R_{max} = 1 \text{ K}\Omega$
2. ✗  $R_{max} = 21 \text{ K}\Omega$
3. ✗  $R_{max} = 0.21 \text{ K}\Omega$
4. ✓  $R_{max} = 2.1 \text{ K}\Omega$

Question Number : 52 Question Type : MCQ

Correct : 1 Wrong : 0.33

An amplitude modulated signal is given by:

$$S(t) = 10 \cos(2\pi \times 10^6 t) + 5 \cos(2\pi \times 10^6 t) \cos(2\pi \times 10^3 t) + 2 \cos(2\pi \times 10^6 t) \cos(4\pi \times 10^3 t)$$

The effective modulation index is:

Options :

1. ✓ 0.538
2. ✗ 0.5
3. ✗ 0.2
4. ✗ 0.7

Question Number : 53 Question Type : MCQ

Correct : 1 Wrong : 0.33

What is the output of Hilbert transform when the modulating signal is  $m(t) = \sin \omega_0 t$ ?

Options :

1. ✗  $-\sin \omega_0 t$
2. ✗  $\cos \omega_0 t$
3. ✓  $-\cos \omega_0 t$
4. ✗  $-\sin \frac{\omega_0 t}{2}$

Question Number : 54 Question Type : MCQ

Correct : 1 Wrong : 0.33

A superheterodyne receiver is tuned at frequency  $f_s = 1000$  KHz, quality factor  $Q = 100$ . Calculate image frequency and rejection ratio, if intermediate frequency is 455KHz.

Options :

1. ✗ 910 KHz, 138
2. ✓ 1910 KHz, 138
3. ✗ 90 KHz, 1.38
4. ✗ 1910 KHz, 1.38

Question Number : 55 Question Type : MCQ

Correct : 1 Wrong : 0.33

The figure of merit (F) and output of suppressed carrier receiver contains:

Options :

1. ✗  $F = 1$ , quadrature phase component of narrowband noise
2. ✗  $F = 0.5$ , quadrature phase component of narrowband noise
3. ✗  $F = 0.5$ , in-phase component of narrowband noise
4. ✓  $F = 1$ , in-phase component of narrowband noise

Question Number : 56 Question Type : MCQ

Correct : 1 Wrong : 0.33

The statistically independent random variables 'X' and 'Y' have mean value  $U_x = 2$  and  $U_y = 4$ . They have second order moments  $E[X^2] = 8$  and  $E[Y^2] = 25$ .

What is  $E[W^2]$  for the random variable  $W = 3X - Y$ ?

Options :

1. ✓ 49

- 2. ✗ 40
- 3. ✗ 145
- 4. ✗ 0

Question Number : 57 Question Type : MCQ

Correct : 1 Wrong : 0.33

In a PCM, amplitude levels are transmitted in a 7 unit code. The sampling is done at a rate 20 KHz. The bandwidth should be:

Options :

- 1. ✗ 5 MHz
- 2. ✓ 70 KHz
- 3. ✗ 35 KHz
- 4. ✗ 5 KHz

Question Number : 58 Question Type : MCQ

Correct : 1 Wrong : 0.33

In a matched filter, probability of error depends on:

Options :

- 1. ✓ Signal energy
- 2. ✗ Signal wave shape
- 3. ✗ both signal energy and signal wave shape
- 4. ✗ independent of both signal energy and signal wave shape

Question Number : 59 Question Type : MCQ

Correct : 1 Wrong : 0.33

In a binary system, the symbols 0 and 1 occur with a probability of  $p_0$  and  $p_1$  respectively. The maximum value for entropy occurs when:

Options :

- 1. ✗  $p_0 > p_1$
- 2. ✗  $p_0 < p_1$
- 3. ✗  $p_0 = \text{zero}$
- 4. ✓  $p_0 = p_1$

Question Number : 60 Question Type : MCQ

Correct : 1 Wrong : 0.33

Maximum probability of error occurs in:

Options :

- 1. ✗ PSK (Phase Shift Keying)
- 2. ✗ DPSK (Differential Phase Shift Keying)
- 3. ✓ ASK (Amplitude Shift Keying)
- 4. ✗ FSK (Frequency Shift Keying)

Question Number : 61 Question Type : MCQ

Correct : 1 Wrong : 0.33

For an intrinsic semiconductor,  $n_i = 1 \times 10^{10}/\text{cm}^3$  and  $q = 1.6 \times 10^{-19} \text{ C}$  electron and holes drift mobilities at room temperature are 1350 and 450  $\text{cm}^2/\text{V}\cdot\text{s}$ , the intrinsic resistivity is:

Options :

1. ✗  $10^6 \Omega \cdot \text{cm}$
2. ✗  $10^3 \Omega \cdot \text{cm}$
3. ✓  $3.5 \times 10^5 \Omega \cdot \text{cm}$
4. ✗  $3.5 \times 10^4 \Omega \cdot \text{cm}$

Question Number : 62 Question Type : MCQ

Correct : 1 Wrong : 0.33

In a n-degenerate type semiconductor, the electron density in conduction band is:

Options :

1. ✓  $N_D > N_c > n_i$
2. ✗  $N_D < N_c < n_i$
3. ✗  $N_c > N_D < n_i$
4. ✗  $n_i > N_D > N_c$

Question Number : 63 Question Type : MCQ

Correct : 1 Wrong : 0.33

In BJT to avoid Punchthrough:

Options :

1. ✗ collector doping should be high and base doping should be low.
2. ✓ collector doping should be low and base doping should be high.
3. ✗ doping of both sides should be equal.
4. ✗ either "collector doping should be high and base doping should be low" or "collector doping should be low and base doping should be high".

Question Number : 64 Question Type : MCQ

Correct : 1 Wrong : 0.33

The reverse saturation current doubles when the junction temperature increases by:

Options :

1. ✗  $1^\circ\text{C}$
2. ✗  $2^\circ\text{C}$
3. ✗  $4^\circ\text{C}$
4. ✓  $10^\circ\text{C}$

Question Number : 65 Question Type : MCQ

Correct : 1 Wrong : 0.33

The threshold voltage ( $V_t$ ) of a MOSFET is 1 V and  $V_{GS} = V_{DS}$ . If the drain current ( $I_D$ ) is 1 mA for  $V_{GS} = 2$  V, then for  $V_{GS} = 3$  V,  $I_D$  is:

Options :

1. ✗ 2 mA
2. ✗ 9 mA
3. ✓ 4 mA
4. ✗ 3 mA

Question Number : 66 Question Type : MCQ

Correct : 1 Wrong : 0.33

In a mosfet gate, voltage controls:

Options :

1. ✓ drain current
2. ✗ source voltage
3. ✗ drain voltage
4. ✗ threshold voltage

Question Number : 67 Question Type : MCQ

Correct : 1 Wrong : 0.33

A JFET has  $I_{DSS} = 5$  mA and  $g_{m0} = 5000 \mu\text{S}$ . What is the value of  $V_{GS(\text{off})}$  and for  $V_{GS} = -1$  V  $g_m$  is:

Options :

1. ✗  $V_{GS(\text{off})} = -2$  V,  $g_m = 7500 \mu\text{S}$
2. ✗  $V_{GS(\text{off})} = -1$  V,  $g_m = 7500 \mu\text{S}$
3. ✗  $V_{GS(\text{off})} = -1$  V,  $g_m = 2500 \mu\text{S}$
4. ✓  $V_{GS(\text{off})} = -2$  V,  $g_m = 2500 \mu\text{S}$

Question Number : 68 Question Type : MCQ

Correct : 1 Wrong : 0.33

For P-N junction diode, donor and acceptor doping concentrations are  $N_D = 10^{17}/\text{cm}^3$  and  $N_A = 10^{15}/\text{cm}^3$  respectively. If  $\epsilon_{si} = 11.7 \times 8.85 \times 10^{-14} \text{ F/cm}$ ,  $V_t = 0.0258$  V and  $n_i = 1.5 \times 10^{10}/\text{cm}^3$ , the open junction capacitance is:

Options :

1. ✓  $1.095 \times 10^{-8} \text{ F/cm}^2$
2. ✗  $10.95 \times 10^{-8} \text{ F/cm}^2$
3. ✗  $109.5 \times 10^{-8} \text{ F/cm}^2$
4. ✗  $1095 \times 10^{-8} \text{ F/cm}^2$

Question Number : 69 Question Type : MCQ

Correct : 1 Wrong : 0.33

A Photodiode is normally:

Options :

1. ✘ forward biased
2. ✘ emitting light
3. ✘ neither forward nor reverse biased
4. ✓ reverse biased

Question Number : 70 Question Type : MCQ

Correct : 1 Wrong : 0.33

In a single stage differential amplifier, the output offset voltage is basically dependent on the mismatch of:

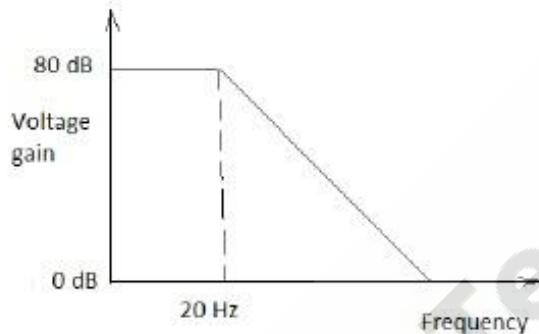
Options :

1. ✘  $V_{BE}$  and  $\beta$
2. ✘  $V_{BE}$  and  $I_B$
3. ✓  $I_B$  and  $\beta$
4. ✘  $V_{BE}$ ,  $I_B$ ,  $\beta$

Question Number : 71 Question Type : MCQ

Correct : 1 Wrong : 0.33

The voltage gain versus frequency curve of an op-amp is shown in the figure. The gain bandwidth product of op-amp is



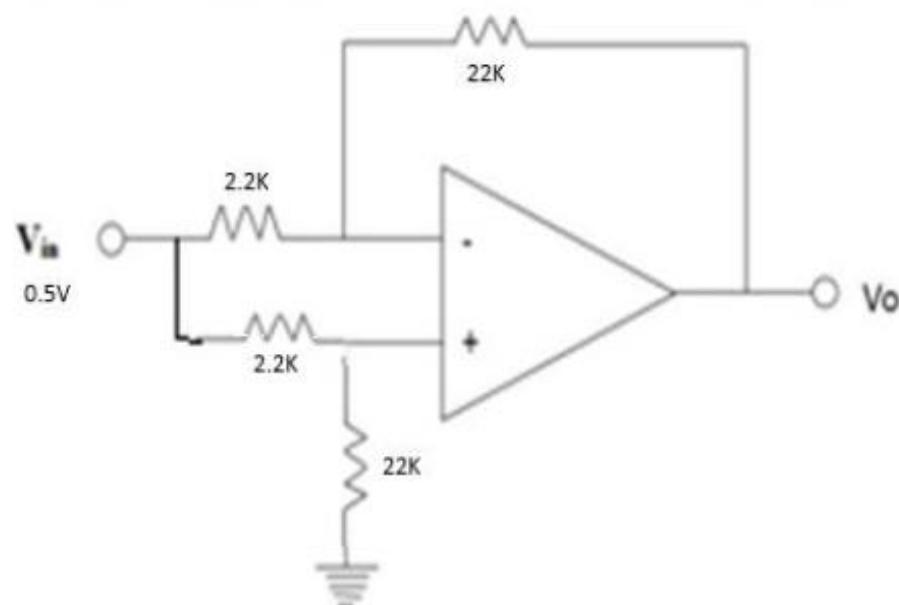
Options :

1. ✘ 200 Hz
2. ✘ 200 MHz
3. ✓ 200 KHz
4. ✘ 2 MHz

Question Number : 72 Question Type : MCQ

Correct : 1 Wrong : 0.33

In the op-amp circuit shown below (assuming ideal op-amp)



Options :

1. ✗  $V_o = -5 \text{ V}$
2. ✓  $V_o = 0 \text{ V}$
3. ✗  $V_o = +5 \text{ V}$
4. ✗  $V_o = -2 \text{ V}$

Question Number : 73 Question Type : MCQ

Correct : 1 Wrong : 0.33

An amplifier has two identical cascaded stages. Each stage has bandwidth of 20 KHz. The overall bandwidth shall approximately be equal to:

Options :

1. ✗ 10 KHz
2. ✓ 12.9 KHz
3. ✗ 20 KHz
4. ✗ 28.3 KHz

Question Number : 74 Question Type : MCQ

Correct : 1 Wrong : 0.33

With reference to BJT,  $f_T$  is the frequency at which the short circuit:

Options :

1. ✗ Common collector current gain has a magnitude of unity
2. ✗ Common base current gain has a magnitude of unity
3. ✓ Common emitter current gain has a magnitude of unity
4. ✗ Common emitter current gain has a magnitude of  $\frac{1}{\sqrt{2}}$

Question Number : 75 Question Type : MCQ

Correct : 1 Wrong : 0.33

Consider the following statements.

1. A clamper clamps a signal to different DC level.
2. The shape of the signal does not change, only the DC level shifts.
3. The use of capacitor is essential in a clamper circuit.

Which of the given statements are correct?

Options :

1. ✘ 1 and 2
2. ✘ 1 and 3
3. ✘ 2 and 3
4. ✓ 1, 2 and 3

Numerical and logical Reasoning questions

Mandatory or Optional:

Mandatory

Question Number : 76 Question Type : MCQ

Correct : 1 Wrong : 0.33

Find out the word-pair in which the two words hold the same relationship as the two words in the word-pair given below.

Orange : Apple

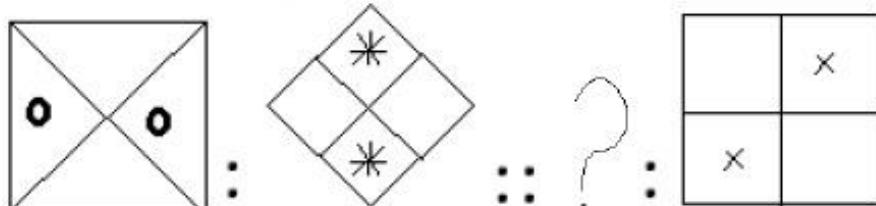
Options :

1. ✘ House : Family
2. ✘ Pen : Ink
3. ✘ Tree : Flower
4. ✓ Table : Chair

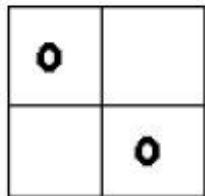
Question Number : 77 Question Type : MCQ

Correct : 1 Wrong : 0.33

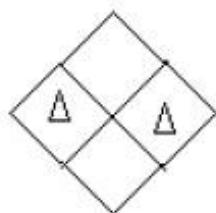
The first two figures on the left side of the sign ‘::’ are related in a certain way. The same relationship holds for the second pair of figures on the right side of the sign ‘::’, of which one is missing. Which of the following is the missing one?



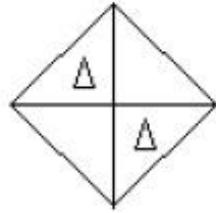
Options :



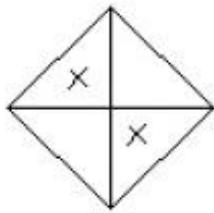
1. ✘



2. ✘



3. ✓



4. ✘

Question Number : 78 Question Type : MCQ

Correct : 1 Wrong : 0.33

Which number will replace the question mark in the number series below?

3, 4, 13, 38, ?, 168

Options :

1. ✘ 63

2. ✓ 87

3. ✘ 77

4. ✘ 102

Question Number : 79 Question Type : MCQ

Correct : 1 Wrong : 0.33

If 12% of 40% of X = 84, then what is the value of X?

Options :

1. ✘ 1600

2. ✘ 1680

3. ✓ 1750

4. ✘ 1860

Question Number : 80 Question Type : MCQ

Correct : 1 Wrong : 0.33

P is the brother of Q and son of R. V is the sister of T, who is the daughter of Q. If R is the husband of S, then which of the following is true?

Options :

1. ✓ V is the granddaughter of S

2. ✳ R is the grandfather of Q
3. ✳ S is the mother of T
4. ✳ V is the nephew of P

**Question Number : 81 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Four months are given below out of which three are alike in some manner and one is different. Which of the given months is different from the other three?

**Options :**

1. ✳ October
2. ✳ January
3. ✓ June
4. ✳ December

**Question Number : 82 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Four figures are given below out of which three are similar in a certain way and one is different. Which of the given figures is different from the other three?

**Options :**

1. ✳ 
2. ✓ 
3. ✳ 
4. ✳ 

**Question Number : 83 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

If ‘+’ means ‘÷’, ‘÷’ means ‘-’, ‘-’ means ‘×’ and ‘×’ means ‘+’, then

$$(12 + 4 \times 2) \times 6 - 4 \div 2 = ?$$

**Options :**

1. ✓ 27
2. ✳ 24
3. ✳ 17
4. ✳ 14

**Question Number : 84 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

If 'DAUGHTER' is coded as 'SFUIHVBE' in a certain language, then how would 'PROBLEM' be coded as in the same language?

**Options :**

1. ✗ LDKANQO
2. ✓ NFMCPSQ
3. ✗ QSPCMFN
4. ✗ NFMCSPQ

**Question Number : 85 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Each of the following two rows contains 3 numbers. Some rules are given below to be used for getting the resultant for each row separately. Apply the rules for each row from left to right and answer the question.

*Rules:*

- (i) If an even number is followed by an odd but not prime number, both are to be multiplied.
- (ii) If an even number is followed by a prime number, both are to be added.
- (iii) If an odd number is followed by a composite odd number, the first number is to be subtracted from the square of the second number.
- (iv) If an odd number is followed by an even number, the odd one is to be subtracted from the even number.

Row I: 16, 9, 23

Row II: 13, 38, 25

What is the difference between the resultants of the first row and the second row?

**Options :**

1. ✗ 193
2. ✗ 26
3. ✗ 767
4. ✓ 433

Computer Applications

Mandatory or Optional:

Mandatory

**Question Number : 86 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

The operating system for mobile phones developed by Google is:

**Options :**

1. ✗ Amoeba
2. ✗ Magellan
3. ✓ Android
4. ✗ Ubuntu

Question Number : 87 Question Type : MCQ

Correct : 1 Wrong : 0.33

The CPU of a computer consists of:

Options :

1. ✓ ALU, control unit and registers
2. ✗ ALU and control unit
3. ✗ ALU, control unit and hard disk
4. ✗ ALU, control unit and monitor

Question Number : 88 Question Type : MCQ

Correct : 1 Wrong : 0.33

Which of the following is both an input and an output device?

Options :

1. ✗ Touch screen
2. ✗ LCD projector panel
3. ✗ Audio cards
4. ✓ Modem

Question Number : 89 Question Type : MCQ

Correct : 1 Wrong : 0.33

A program in execution is called:

Options :

1. ✓ Process
2. ✗ Instruction
3. ✗ Procedure
4. ✗ Function

Question Number : 90 Question Type : MCQ

Correct : 1 Wrong : 0.33

Criterion used for judging appropriateness of tool software is:

Options :

1. ✗ Scalability
2. ✗ Compatibility
3. ✓ Functionality
4. ✗ Security

Question Number : 91 Question Type : MCQ

Correct : 1 Wrong : 0.33

Which one of the following decimal number is equivalent to  $(10000010)_2$ ?

Options :

1. ✓  $130_{10}$
2. ✗  $200_{10}$
3. ✗  $1010_{10}$
4. ✗  $304_{10}$

**Question Number : 92 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

In a spreadsheet, one function inside another is called:

**Options :**

1. ✘ Text
2. ✓ Nested
3. ✘ Sum
4. ✘ Round

**Question Number : 93 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Which of the following is not a part of the Office Suite?

**Options :**

1. ✘ Database
2. ✘ Image editor
3. ✓ File manager
4. ✘ Word processor

**Question Number : 94 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Which of the following is not a Search Engine?

**Options :**

1. ✘ Yahoo
2. ✘ Alta Vista
3. ✘ Google
4. ✓ Facebook

**Question Number : 95 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

A shared network within an organisation to provide connectivity to the staff is called:

**Options :**

1. ✘ Internet
2. ✓ Intranet
3. ✘ Delnet
4. ✘ Extranet

**GK / Awareness**

Mandatory or Optional:

Mandatory

**Question Number : 96 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Which Mughal ruler was on the throne of India when East India company was permitted to establish a factory at Surat?

**Options :**

1. ✘ Aurangzeb
2. ✘ Humayun
3. ✓ Jehangir
4. ✘ Shahjahan

**Question Number : 97 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Who advises the centre on legal matters?

**Options :**

1. ✘ Advocate General of india
2. ✘ President of India
3. ✓ Attorney General of India
4. ✘ Chief Justice of India

**Question Number : 98 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Which of the following payment instruments is known as plastic money?

**Options :**

1. ✘ Bearer Cheques
2. ✘ Gift Cheques
3. ✘ Demand Drafts
4. ✓ Credit Cards

**Question Number : 99 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

EEG is taken out for diagnosing ailments of which of the following?

**Options :**

1. ✓ Brain
2. ✘ Heart
3. ✘ Lungs
4. ✘ Stomach

**Question Number : 100 Question Type : MCQ**

**Correct : 1 Wrong : 0.33**

Prime Minister Narendra Modi has recently launched the "Give It Up" Campaign for voluntarily giving up which of the following?

**Options :**

1. ✘ Drugs
2. ✘ Plastics
3. ✘ Ration
4. ✓ LPG Subsidy