

National Testing Agency

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Electronics Communication and Information Engineering

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Electronics Communication and Information Engineering

Section Id :	3016982
Section Number :	1
Section type :	Online
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Number of Questions to be attempted :	75
Section Marks :	300
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	3016982
Question Shuffling Allowed :	Yes

Question Number : 1 Question Id : 30169876 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A quadratic function of two variables is given as $f(x_1, x_2) = x_1^2 + 2x_2^2 + 3x_1 + 3x_2 + x_1x_2 + 1$. The magnitude of maximum rate of change of the function at the point (1,1) is

1. 10
2. 64
3. 100
4. 14

Options :

301698301. 1
301698302. 2
301698303. 3
301698304. 4

Question Number : 2 Question Id : 30169877 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For a given vector $W^T = [1, 2, 3]$, the vector is normal to the plane defined by $W^T \cdot X = 1$

1. $[-2, -2, 2]^T$
2. $[3, 0, -1]^T$
3. $[3, 2, 1]^T$
4. $[1, 2, 3]^T$

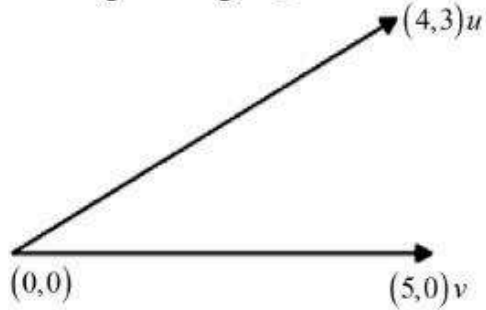
Options :

301698305. 1
301698306. 2
301698307. 3
301698308. 4

Question Number : 3 Question Id : 30169878 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the given figure, the vectors u and v are related as : $Au = v$ by a transformation matrix A .



The correct choice of matrix A is

1. $\begin{bmatrix} \frac{4}{5} & \frac{3}{5} \\ -\frac{3}{5} & \frac{4}{5} \end{bmatrix}$

2. $\begin{bmatrix} \frac{4}{5} & -\frac{3}{5} \\ \frac{3}{5} & \frac{4}{5} \end{bmatrix}$

3. $\begin{bmatrix} \frac{4}{5} & \frac{3}{5} \\ \frac{3}{5} & \frac{4}{5} \end{bmatrix}$

4. $\begin{bmatrix} \frac{4}{5} & -\frac{3}{5} \\ \frac{3}{5} & -\frac{4}{5} \end{bmatrix}$

Options :

301698309. 1

301698310. 2

301698311. 3

301698312. 4

Question Number : 4 Question Id : 30169879 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Let the probability density function of a random variable x be given as

$$f(x) = ae^{-2|x|}$$

The value of ' a ' is

1. 0.1

2. 0.5

3. 1

4. 1.5

Options :

301698313. 1

301698314. 2

301698315. 3

301698316. 4

Question Number : 5 Question Id : 30169880 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For a real number $n > 1$

$$\frac{1}{\log_2 n} + \frac{1}{\log_3 n} + \frac{1}{\log_4 n} = 1$$

The value of n is

1. 4

2. 12

3. 24

4. 36

Options :

301698317. 1

301698318. 2

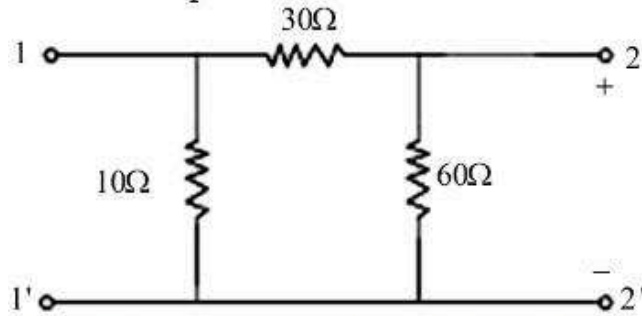
301698319. 3

301698320. 4

Question Number : 6 Question Id : 30169881 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

For the two port network shown below.



The impedances Z_{11} , Z_{12} , and Z_{22} (in Ω) are

- A. 6Ω
- B. 9Ω
- C. 24Ω

Choose the **correct** sequence of Z_{11} , Z_{12} , and Z_{22} in answer from the options given below:

1. A, B, C
2. A, C, B
3. B, A, C
4. C, B, A

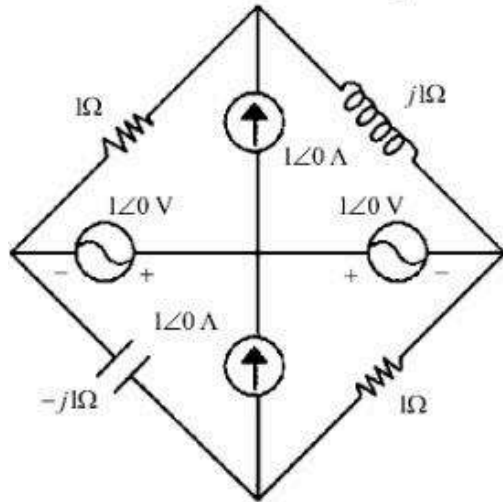
Options :

- 301698321. 1
- 301698322. 2
- 301698323. 3
- 301698324. 4

Question Number : 7 Question Id : 30169882 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the circuit shown below, the current through the inductor (in A) is



1. $\frac{2}{1+j}$

2. $\frac{-1}{1+j}$

3. $\frac{1}{1+j}$

4. 0

Options :

301698325. 1

301698326. 2

301698327. 3

301698328. 4

Question Number : 8 Question Id : 30169883 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The nodal method of circuit analysis is based on

1. KVL and Ohm's law

2. KCL and Ohm's law

3. KCL and KVL

4. KCL, KVL and Ohm's law

Options :

301698329. 1

301698330. 2

301698331. 3

301698332. 4

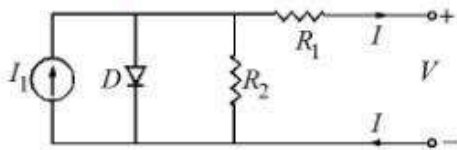
Question Number : 9 Question Id : 30169884 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the diode circuit shown below. The diode, D , obeys the current-voltage characteristic

$$I_D = I_s \left(\exp \left(\frac{V_D}{nV_T} \right) - 1 \right)$$

Where, $n > 1$, $V_T > 0$, V_D is the voltage across the diode and I_D is the current through it. The circuit is biased so that voltage $V > 0$ and current, $I < 0$ If you had to design this circuit to transfer maximum power from the current source (I_1) to a resistive load (not shown) at the output, what values R_1 and R_2 would you choose?



- A. Small R_1
- B. Large R_1
- C. Small R_2
- D. Large R_2

Choose the **correct** answer from the options given below:

- 1. A and C
- 2. B and C
- 3. A and D
- 4. B and D

Options :

301698333. 1

301698334. 2

301698335. 3

301698336. 4

Question Number : 10 Question Id : 30169885 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If the number of zeros are less than the number of poles, i.e. $Z < P$, then the value of the transfer function becomes zero for $s \rightarrow \infty$. Hence, some zeros are located at infinity and the order of such zeros will be:

1. Z
2. $P + Z$
3. $Z - P$
4. $P - Z$

Options :

301698337. 1
 301698338. 2
 301698339. 3
 301698340. 4

Question Number : 11 Question Id : 30169886 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A periodic signal $x(t)$ of period T_0 is given by

$$x(t) = \begin{cases} 1, & |t| < T_1 \\ 0, & T_1 < |t| < \frac{T_0}{2} \end{cases} \text{ The dc component of } x(t) \text{ is}$$

1. $\frac{T_1}{T_0}$
2. $\frac{T_1}{2T_0}$
3. $\frac{2T_1}{T_0}$
4. $\frac{T_0}{T_1}$

Options :

301698341. 1
 301698342. 2
 301698343. 3
 301698344. 4

Question Number : 12 Question Id : 30169887 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Signals and their Fourier Transforms are given in the table below. Match **LIST-I** with **LIST-II**

LIST-I Signal $[x(t)]$		LIST-II Fourier Transform $[X(\omega)]$	
A.	$e^{-at}u(t), a > 0$	I.	$\pi[\delta(\omega - \omega_0) + \delta(\omega + \omega_0)]$
B.	$\cos \omega_0 t$	II.	$\frac{1}{j\omega + a}$
C.	$\sin \omega_0 t$	III.	$\frac{1}{(j\omega + a)^2}$
D.	$te^{-a t }u(t), a > 0$	IV.	$-j\pi[\delta(\omega - \omega_0) - \delta(\omega + \omega_0)]$

Choose the **correct** answer from the options given below:

1. A-I, B-II, C-III, D-IV
2. A-II, B-I, C-IV, D-III
3. A-I, B-II, C-IV, D-III
4. A-III, B-IV, C-I, D-II

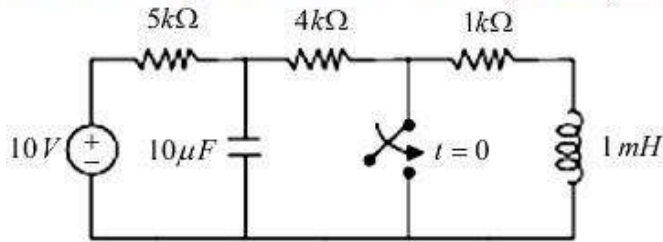
Options :

301698345. 1
 301698346. 2
 301698347. 3
 301698348. 4

Question Number : 13 Question Id : 30169888 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the figure shown below, the ideal switch has been open for a long time. If it is closed at $t = 0$, then the magnitude of the current (in mA) through the $4\text{ k}\Omega$ resistor at $t = 0+$ is



1. 1 mA
2. 1.25 mA
3. 1.5 mA
4. 1.75 mA

Options :

301698349. 1
 301698350. 2
 301698351. 3
 301698352. 4

Question Number : 14 Question Id : 30169889 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider an LTI system with a system function

$$H(z) = \frac{1}{1 - \frac{1}{4}Z^{-1}}$$

Its difference equation will be

1. $y[n] - \frac{1}{2}y[n-1] = x[n]$
2. $y[n] - \frac{1}{4}y[n+1] = x[n]$
3. $y[n] + \frac{1}{2}y[n-1] = x[n]$
4. $y[n] - \frac{1}{4}y[n-1] = x[n]$

Options :

301698353. 1
 301698354. 2
 301698355. 3

301698356. 4

Question Number : 15 Question Id : 30169890 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A discrete-time system has an input-output relationship:

$$y[n] = \begin{cases} x[n], & (n \geq 0) \\ 0, & (n = 0) \\ x[n+1], & (n \leq -1) \end{cases}$$

where, $x[n]$ is the input and $y[n]$ is the output. The given system may have the properties

- A. Linearity
- B. Time-invariance
- C. Causality
- D. Stability

Choose the **correct** properties of the given system from the options given below:

- 1. A and D only
- 2. A and B only
- 3. A, B and C only
- 4. A, B, C, D

Options :

- 301698357. 1
- 301698358. 2
- 301698359. 3
- 301698360. 4

Question Number : 16 Question Id : 30169891 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The convolution of $x(-t)$ with impulse function $\delta(-t-t_0)$ is equal to

- 1. $x(t+t_0)$
- 2. $x(t-t_0)$
- 3. $x(-t+t_0)$
- 4. $x(-t-t_0)$

Options :

- 301698361. 1

301698362. 2

301698363. 3

301698364. 4

Question Number : 17 Question Id : 30169892 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A 1 kHz signal is flat-top sampled at the rate of 1800 samples/sec and the samples are applied to an ideal rectangular low pass filter with a cut-off frequency of 1100 Hz. Then the output of the filter contains:

1. 800 Hz and 1000 Hz components.
2. 800 Hz and 900 Hz components.
3. 800 Hz, 900 Hz and 1000 Hz components.
4. only 800 Hz component.

Options :

301698365. 1

301698366. 2

301698367. 3

301698368. 4

Question Number : 18 Question Id : 30169893 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Due to illumination by light, the electron and hole concentrations in a heavily doped N-type semiconductor increase by Δn and Δp , respectively. If n_i is the intrinsic concentration, then

1. $\Delta n < \Delta p$
2. $\Delta n > \Delta p$
3. $\Delta n = \Delta p$
4. $\Delta n \times \Delta p = n_i^2$

Options :

301698369. 1

301698370. 2

301698371. 3

301698372. 4

Question Number : 19 Question Id : 30169894 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Under high electric fields, in a semiconductor with an increasing electric field,

1. the mobility of the charge carriers decreases and the velocity of the charge carriers saturates.
2. the mobility of the carriers and the velocity of the charge carriers, both increase.
3. the mobility of the charge carriers decreases and the velocity of the charge carriers becomes zero.
4. the mobility of the carriers increases and the velocity of the charge carriers becomes zero.

Options :

301698373. 1
 301698374. 2
 301698375. 3
 301698376. 4

Question Number : 20 Question Id : 30169895 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

At room temperature, the energy band gap of different materials have been listed in the table below. Correctly match the energy band gap (List-I) with the corresponding material (List-II).

LIST-I (Energy band gap)		LIST-II (Material)	
A.	$E_g = 0.67 \text{ eV}$	I.	Polymer
B.	$E_g = 1.1 \text{ eV}$	II.	Germanium
C.	$E_g = 1.43 \text{ eV}$	III.	Silicon
D.	$E_g > 5 \text{ eV}$	IV.	Gallium Arsenide

Choose the **correct** answer from the options given below:

1. A - IV, B - II, C - III, D - I
2. A - II, B - III, C - IV, D - I
3. A - I, B - II, C - IV, D - III
4. A - III, B - IV, C - I, D - II

Options :

301698377. 1
 301698378. 2
 301698379. 3
 301698380. 4

Question Number : 21 Question Id : 30169896 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Crossover distortion behavior is characteristic of

1. Class A amplifier.
2. Class B amplifier.
3. Class AB amplifier.
4. Common-base amplifier.

Options :

301698381. 1

301698382. 2

301698383. 3

301698384. 4

Question Number : 22 Question Id : 30169897 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In a *p*-type *Si* sample, the hole concentration is $2.25 \times 10^{15} \text{ cm}^{-3}$ and the intrinsic carrier concentration is $1.5 \times 10^{10} \text{ cm}^{-3}$. The value of electron concentration will be

1. Zero
2. 10^{10} cm^{-3}
3. 10^5 cm^{-3}
4. $1.5 \times 10^{25} \text{ cm}^{-3}$

Options :

301698385. 1

301698386. 2

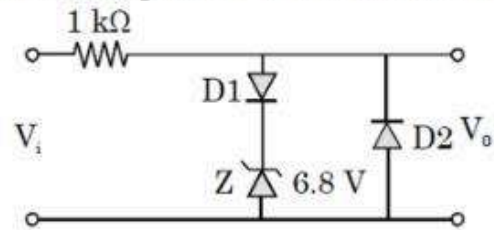
301698387. 3

301698388. 4

Question Number : 23 Question Id : 30169898 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the following limiter circuit, the input voltage $V_i = 10 \sin(100 \pi t)$ V is applied. Assume that the diode drop is 0.7 V when it is forward biased and the Zener breakdown voltage is 6.8 V.



The maximum and minimum values of the output voltage, respectively, are

- 1. 6.1 V, -0.7 V
- 2. 0.7 V, -7.5 V
- 3. 7.5 V, -0.7 V
- 4. 7.5 V, -7.5 V

Options :

- 301698389. 1
- 301698390. 2
- 301698391. 3
- 301698392. 4

Question Number : 24 Question Id : 30169899 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1 The different diodes and their applications are shown in List-I and List-II, respectively. Match list List-I with List-II.

LIST-I		LIST-II	
A.	Varactor diode	I.	Voltage reference
B.	PIN Diode	II.	High-frequency switch
C.	Zener diode	III.	Tuned circuits
D.	Schottky diode	IV.	Current controlled attenuator

Choose the **correct** answer from the options given below:

- 1. A - III, B - II, C - I, D - IV
- 2. A - II, B - III, C - I, D - IV
- 3. A - I, B - II, C - IV, D - III
- 4. A - III, B - IV, C - I, D - II

Options :

- 301698393. 1

301698394. 2

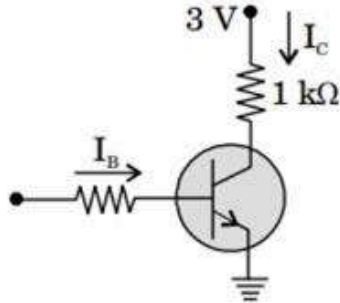
301698395. 3

301698396. 4

Question Number : 25 Question Id : 301698100 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Assuming $V_{CEsat} = 0.2 \text{ V}$ and $\beta = 50$, the minimum base current (I_{Bmin}) required to drive the transistor in the figure to saturation is

1. $56 \mu\text{A}$ 2. $140 \mu\text{A}$ 3. $60 \mu\text{A}$ 4. $3 \mu\text{A}$

Options :

301698397. 1

301698398. 2

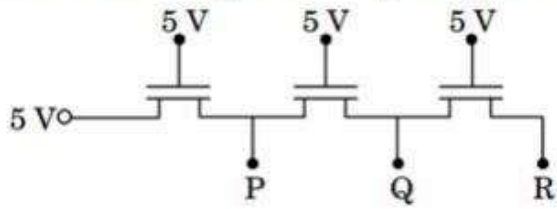
301698399. 3

301698400. 4

Question Number : 26 Question Id : 301698101 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The following circuit employing pass transistor logic, all NMOS transistors are identical with a threshold voltage of 1 V. Ignoring the body-effect, the output voltages at P, Q and R are,



1. 4 V, 4 V, 4 V

2. 4 V, 3 V, 2 V

3. 5 V, 5 V, 5 V

4. 5 V, 4 V, 3 V

Options :

301698401. 1

301698402. 2

301698403. 3

301698404. 4

Question Number : 27 Question Id : 301698102 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

If fixed positive charges are present in the gate oxide of an n -channel enhancement type MOSFET, it will lead to

1. a decrease in the threshold voltage

2. channel length modulation

3. an increase in substrate leakage current

4. an increase in accumulation capacitance

Options :

301698405. 1

301698406. 2

301698407. 3

301698408. 4

Question Number : 28 Question Id : 301698103 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The early-effect in a BJT is caused by

1. fast turn-on
2. fast turn-off
3. large collector—base reverse bias
4. large emitter—base forward bias

Options :

301698409. 1
301698410. 2
301698411. 3
301698412. 4

Question Number : 29 Question Id : 301698104 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Negative feedback in amplifiers

- A. improves the signal-to-noise ratio at the input.
- B. improves the signal-to-noise ratio at the output.
- C. does not affect the signal-to-noise ratio at the output.
- D. reduces distortion.

Choose the **correct** answer from the options given below:

1. A, C and D only
2. B, C and D only
3. A and C only
4. B and D only

Options :

301698413. 1
301698414. 2
301698415. 3
301698416. 4

Question Number : 30 Question Id : 301698105 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A circuit which resonates at 1 MHz has a Q of 10. Bandwidth between half-power points is

1. 1 kHz
2. 10 kHz
3. 100 kHz
4. 100 Hz

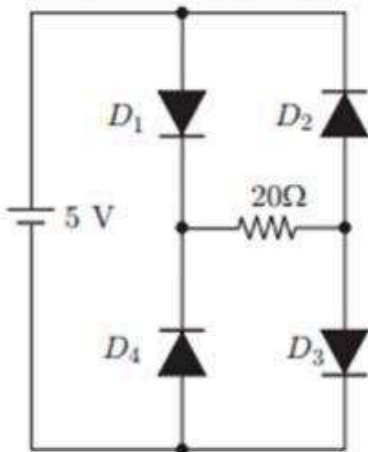
Options :

301698417. 1
 301698418. 2
 301698419. 3
 301698420. 4

Question Number : 31 Question Id : 301698106 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The circuit shown in the figure, the forward voltage of the diode is 0.7 V and its dynamic resistance is $2\ \Omega$. The current through the $20\ \Omega$ resistor is



1. 150 mA
2. 200 mA
3. 300 mA
4. 400 mA

Options :

301698421. 1
 301698422. 2
 301698423. 3
 301698424. 4

Question Number : 32 Question Id : 301698107 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The circuit name (List-I) and their circuit diagram (List-II) are given in the table below. Match List-I with List-II.

LIST-I (Name of the circuit)		LIST-II (Circuit diagram)	
(A)	Zero Crossing Detector	I.	
(B)	Clipper	II.	
(C)	Clamper	III.	
(D)	Peak Detector	IV.	

Choose the **correct** answer from the options given below:

- 1. A - II, B - III, C - IV, D - I
- 2. A - III, B - II, C - I, D - IV
- 3. A - I, B - II, C - IV, D - III
- 4. A - II, B - I, C - IV, D - III

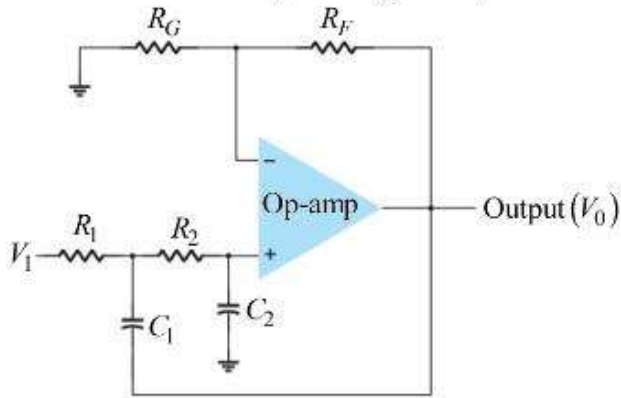
Options :

- 301698425. 1
- 301698426. 2
- 301698427. 3
- 301698428. 4

Question Number : 33 Question Id : 301698108 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The circuit in the given figure is,



1. low-pass filter
2. high-pass filter
3. band-pass filter
4. band-reject filter

Options :

301698429. 1
 301698430. 2
 301698431. 3
 301698432. 4

Question Number : 34 Question Id : 301698109 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The internal blocks in the Voltage-controlled-Oscillator (VCO) IC-566 are given below.

- A. Current Sources
- B. Buffer Amplifier
- C. Schmitt Trigger
- D. Modulation Input

Choose the **correct** sequence (input towards output) of internal blocks of VCO from the options given below from input side to output side:

1. D, B, C, A
2. D, C, B, A
3. D, A, B, C
4. D, A, C, B

Options :

301698433. 1

301698434. 2

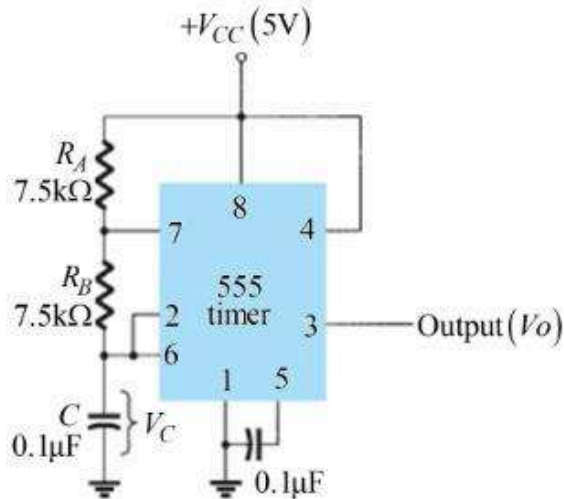
301698435. 3

301698436. 4

Question Number : 35 Question Id : 301698110 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the astable multivibrator circuit shown in the figure, the frequency of oscillation at the output is



1. 544 Hz

2. 54.4 Hz

3. 64.4 Hz

4. 644 Hz

Options :

301698437. 1

301698438. 2

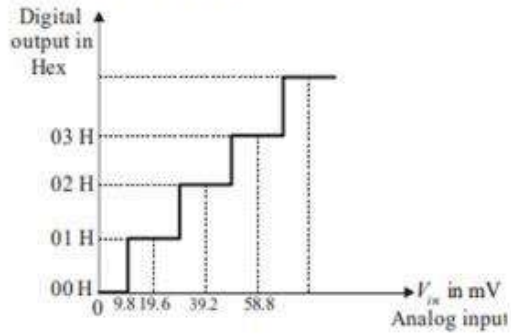
301698439. 3

301698440. 4

Question Number : 36 Question Id : 301698111 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An 8-bit ADC converts analog voltage in the range of 0 to +5 V to the corresponding digital code as per the conversion characteristics shown in the figure. For $V_{in} = 1.9922$ volt, which of the following digital output, given in hex, is true?



1. 64 H

2. 65 H

3. 66 H

4. 67 H

Options :

301698441. 1

301698442. 2

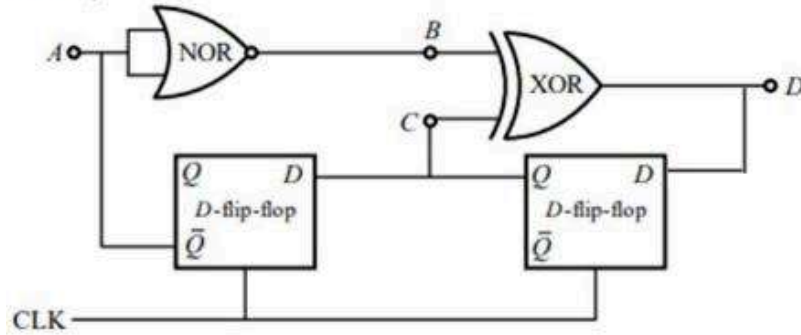
301698443. 3

301698444. 4

Question Number : 37 Question Id : 301698112 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Neglecting the delays due to the logic gates in the circuit shown in the figure, the decimal equivalent of the binary sequence [ABCD] of initial logic states, which will not change with the clock, is



1. 4

2. 6

3. 8

4. 10

Options :

301698445. 1

301698446. 2

301698447. 3

301698448. 4

Question Number : 38 Question Id : 301698113 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A MOD 2 and a MOD 5 up-counter when cascaded together results in a MOD _____ counter.

1. 3

2. 7

3. 10

4. 20

Options :

301698449. 1

301698450. 2

301698451. 3

301698452. 4

Question Number : 39 Question Id : 301698114 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The maximum clock frequency in MHz of a 4-stage ripple counter, utilizing flip-flops, with each flip-flop having a propagation delay of 20 ns, is

1. 12
2. 12.5
3. 13
4. 13.5

Options :

301698453. 1
301698454. 2
301698455. 3
301698456. 4

Question Number : 40 Question Id : 301698115 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

It is desired to multiply the numbers OAH by OBH and store the result in the accumulator. The numbers are available in registers B and C, respectively. A part of the 8085 program for this purpose is given below:

MVI A, 00H

Loop:-----

- A. ADD B
B. JNZ LOOP
C. DCR C
D. HLT END

The sequence of remaining 4 instructions to complete the program would be
Choose the **correct** answer from the options given below:

1. A, B, C, D
2. A, C, B, D
3. B, A, C, D
4. C, B, D, A

Options :

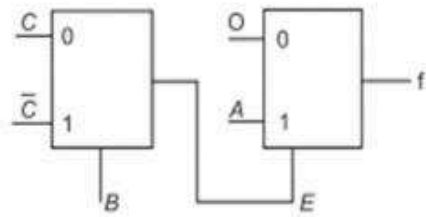
301698457. 1
301698458. 2
301698459. 3

301698460. 4

Question Number : 41 Question Id : 301698116 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The Boolean function f implemented in the figure using two input multiplexers is



1. $A\bar{B}C + AB\bar{C}$
2. $ABC + A\bar{B}\bar{C}$
3. $\bar{A}BC + \bar{A}\bar{B}\bar{C}$
4. $\overline{ABC} + \bar{A}B\bar{C}$

Options :

301698461. 1
 301698462. 2
 301698463. 3
 301698464. 4

Question Number : 42 Question Id : 301698117 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In the root locus plot, the breakaway points

- A. Need not always be on the real axis alone.
- B. Must lie on the root loci
- C. Must lie between 0 and -1

Choose the **correct** answer from the options given below:

1. A, B and C only
2. A and B only
3. A and C only
4. B and C only

Options :

301698465. 1
 301698466. 2

301698467. 3

301698468. 4

Question Number : 43 Question Id : 301698118 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The value of the steady state error for first order system, $\frac{1}{sT+1}$ with Unit Ramp Function will be

1. $\frac{1}{T}$

2. T

3. $\frac{1}{T}e^{\frac{-t}{T}}$

4. $T\left(1 - e^{\frac{-t}{T}}\right)$

Options :

301698469. 1

301698470. 2

301698471. 3

301698472. 4

Question Number : 44 Question Id : 301698119 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which one of the following statements regarding the effect of the phase lead network is not correct?

1. The velocity constant is usually increased.

2. The slope of the magnitude curve is reduced at the gain crossover frequency, as a result relative stability improves.

3. Phase margin increased.

4. The bandwidth decreased

Options :

301698473. 1

301698474. 2

301698475. 3

301698476. 4

Question Number : 45 Question Id : 301698120 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

Bounded-input bounded-output stability implies asymptotic stability for

- A. Completely controllable system
- B. Completely observable system
- C. Uncontrollable system
- D. Unobservable system

Which of the above statements is/are correct? Choose the **correct** answer from the options given below:

- 1. A and D only
- 2. A and B only
- 3. B and C only
- 4. C and D only

Options :

- 301698477. 1
- 301698478. 2
- 301698479. 3
- 301698480. 4

Question Number : 46 Question Id : 301698121 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No Correct Marks : 4 Wrong Marks : 1

A second order control system has a damping ratio $\zeta = 0.8$ and the natural frequency of oscillation $\omega_n = 12$ rad/sec. Determine the damped frequency of oscillation.

- 1. 12 rad/sec.
- 2. 15 rad/sec.
- 3. 9.6 rad/sec.
- 4. 7.2 rad/sec.

Options :

- 301698481. 1
- 301698482. 2
- 301698483. 3
- 301698484. 4

Question Number : 47 Question Id : 301698122 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Choose the correct statements from the following

- A. The lag-compensation has a pole nearer to the origin.
- B. The lag-compensation has a zero nearer to the origin.
- C. The lag-compensator decreases the bandwidth.
- D. The lag-compensator increases the bandwidth.

1. A and D

2. A and C

3. B and D

4. B and C

Options :

301698485. 1

301698486. 2

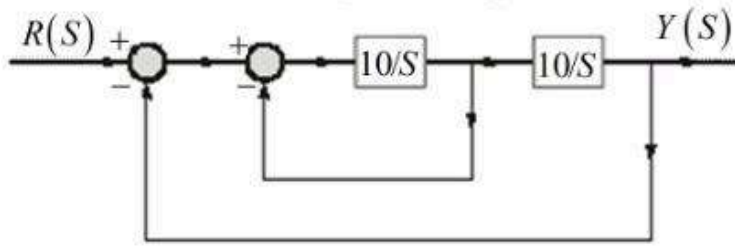
301698487. 3

301698488. 4

Question Number : 48 Question Id : 301698123 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The damping ratio and undamped natural frequency of a closed loop system as shown in the figure, are denoted as ζ and ω_n , respectively.



The value of ζ and ω_n are:

- (A) $\zeta = 0.5$
- (B) $\zeta = 0.707$
- (C) $\omega_n = 10 \text{ rad/s}$
- (D) $\omega_n = 100 \text{ rad/s}$

Choose the **correct** answer from the options given below:

1. A and C
2. A and D
3. B and D
4. B and C

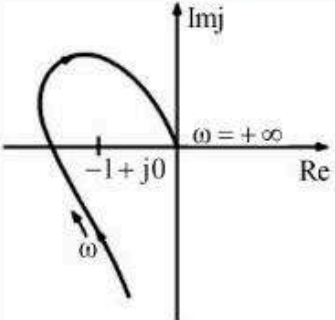
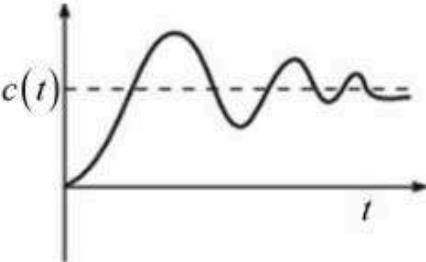
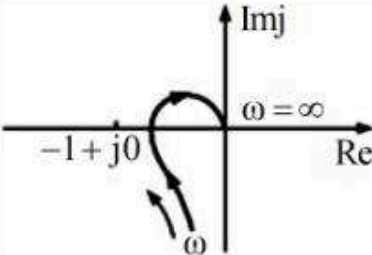
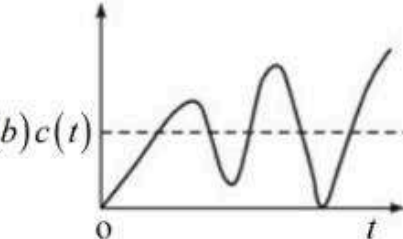
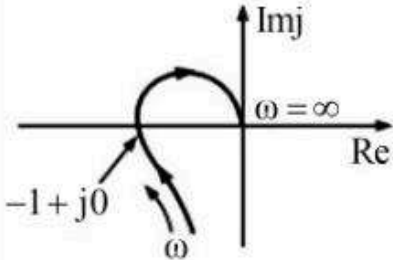
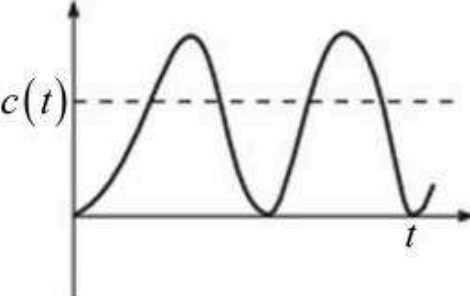
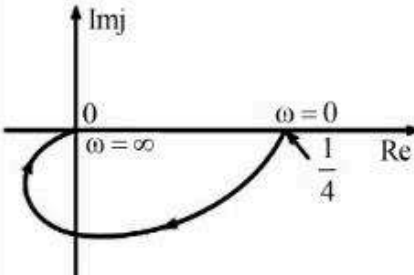
Options :

- 301698489. 1
- 301698490. 2
- 301698491. 3
- 301698492. 4

Question Number : 49 Question Id : 301698124 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The Nyquist plot and step response/transfer function is given. Match List-I (Nyquist plot) with List-II (corresponding step response /transfer function).

	LIST-I (Nyquist plot)		LIST-II (Step response/Transfer function)
(A)		(I)	
(B)		(II)	
(C)		(III)	
(D)		(IV)	$\frac{1}{(S+2)^2}$

Choose the **correct** answer from the options given below:

1. A - II, B - I, C - III, D - IV
2. A - I, B - III, C - II, D - IV
3. A - I, B - II, C - IV, D - III
4. A - III, B - IV, C - I, D - II

Options :

301698493. 1

301698494. 2

301698495. 3

301698496. 4

Question Number : 50 Question Id : 301698125 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In binary data transmission, DPSK is preferred over PSK because

1. more protection is provided against impulse noise
2. for a given energy per bit, the probability of error is less
3. the 180° phase shifts of the carrier are unimportant
4. a coherent carrier is not required to be generated at the receiver

Options :

301698497. 1

301698498. 2

301698499. 3

301698500. 4

Question Number : 51 Question Id : 301698126 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Coherent demodulation of FSK signal can be detected using

1. discriminator detection
2. bandpass filter and envelope detectors
3. matched filter
4. correlation receiver

Options :

301698501. 1

301698502. 2

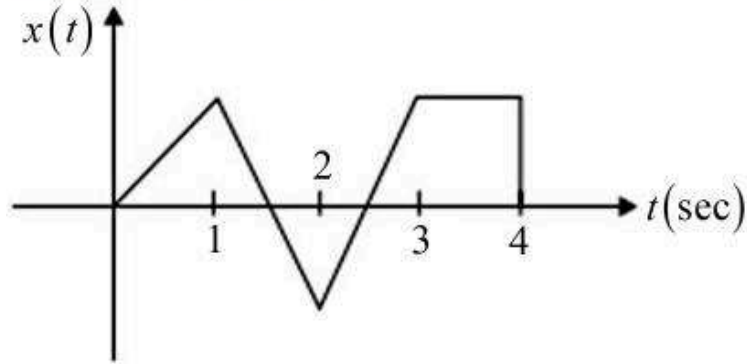
301698503. 3

301698504. 4

Question Number : 52 Question Id : 301698127 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the signal $x(t)$ shown in the figure. Let $h(t)$ denote the impulse response of the filter matched to $x(t)$, with $h(t)$ being non-zero only in the interval 0 to 4 sec. The slope of $h(t)$ in the interval $3 < t < 4$ sec is



1. 0.5 sec^{-1}
2. -0.5 sec^{-1}
3. 1 sec^{-1}
4. -1 sec^{-1}

Options :

301698505. 1
 301698506. 2
 301698507. 3
 301698508. 4

Question Number : 53 Question Id : 301698128 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A baseband PCM system with a matched filter at the receiver is implemented with ± 5 V bipolar with a pulse duration of 72μ sec. If the noise PSD is $1.0 \times 10^{-4} \frac{V^2}{\text{Hz}}$, the probability of error in this system is given by

1. 1.15×10^{-5}
2. 1.85×10^{-5}
3. 2.8×10^{-5}
4. 2.36×10^{-5}

Options :

301698509. 1
 301698510. 2
 301698511. 3

301698512. 4

Question Number : 54 Question Id : 301698129 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Match **List-I** (modulation/generation techniques) with **List-II** (disadvantages/generated signal) and select the correct answer from the given codes:

LIST-I		LIST-II	
(A)	Ring Modulator	(I)	Granular noise
(B)	Pulse Code Modulation	(II)	Threshold effect
(C)	Delta Modulation	(III)	Generation of DSB-SC
(D)	Frequency Modulation	(IV)	Quantization noise

Choose the **correct** answer from the options given below:

1. A - II, B - IV, C - I, D - III
2. A - III, B - I, C - IV, D - II
3. A - IV, B - I, C - II, D - III
4. A - III, B - IV, C - I, D - II

Options :

301698513. 1
 301698514. 2
 301698515. 3
 301698516. 4

Question Number : 55 Question Id : 301698130 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A 10 kW carrier is sinusoidally modulated by two carriers corresponding to a modulation index of 30% and 40%, respectively. The total radiated power is

1. 11.25 kW
2. 12.50 kW
3. 15 kW
4. 17 kW

Options :

301698517. 1
 301698518. 2

301698519. 3

301698520. 4

Question Number : 56 Question Id : 301698131 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The subsystems in an FM receiver are

- A. Mixer
- B. RF amplifier
- C. Limiter
- D. IF amplifier

Choose the **correct** sequence of subsystems in an FM receiver from the options given below:

1. A, B, C, D
2. A, C, B, D
3. B, A, D, C
4. C, B, D, A

Options :

301698521. 1

301698522. 2

301698523. 3

301698524. 4

Question Number : 57 Question Id : 301698132 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The image channel rejection in a superheterodyne receiver comes from

1. detector and RF stages only
2. detector, RF and IF stages
3. IF stages only
4. RF stages only

Options :

301698525. 1

301698526. 2

301698527. 3

301698528. 4

Question Number : 58 Question Id : 301698133 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

X is a continuous random variable with probability density function given by

$$f(x) = \begin{cases} kx & (0 \leq x < 2) \\ 2k & (2 \leq x < 4) \\ -kx + 6k & (4 \leq x < 6) \end{cases}$$

The value of k will be

1. $2/3$

2. 1

3. 8

4. $1/8$

Options :

301698529. 1

301698530. 2

301698531. 3

301698532. 4

Question Number : 59 Question Id : 301698134 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

An image uses 512×512 picture elements. Each of the picture elements can take any of the 8 distinguishable intensity levels. The maximum entropy associated with one image pixel will be

1. 3

2. 8

3. 512

4. 786432

Options :

301698533. 1

301698534. 2

301698535. 3

301698536. 4

Question Number : 60 Question Id : 301698135 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Theorem/law and its corresponding specified quality are given in the table below. Match **List-I** with **List-II**

LIST-I (Theorem/Law)		LIST-II (Specified quality)	
(A)	Shannon Source Theorem	(I)	Channel capacity
(B)	Dimensionality Theorem	(II)	Storage space of a signal
(C)	Wiener-Kintchine Theorem	(III)	Power spectral density
(D)	Shannon- Hartley law	(IV)	Optimum code length

Choose the **correct** answer from the options given below:

1. A - I, B - II, C - III, D - IV
2. A - IV, B - III, C - II, D - I
3. A - I, B - II, C - IV, D - III
4. A - IV, B - II, C - III, D - I

Options :

301698537. 1
 301698538. 2
 301698539. 3
 301698540. 4

Question Number : 61 Question Id : 301698136 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the following codes:

- A. Hamming Code
- B. Huffman Code
- C. Shannon-Fano Code
- D. Convolution Code

Which of these are source codes?

Choose the **correct** answer from the options given below:

1. A, B and D only
2. B and C only
3. A and D only
4. B, C and D only

Options :

301698541. 1
301698542. 2
301698543. 3
301698544. 4

Question Number : 62 Question Id : 301698137 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A dipole antenna, with some excitation in free space was radiating a certain amount of power. If this antenna is immersed in a lake where water is non-magnetic and non-dissipative but has a dielectric constant of 81, the radiated power with the same excitation will

1. decrease to finite non-zero value
2. remain the same
3. increase
4. decrease to zero

Options :

301698545. 1
301698546. 2
301698547. 3
301698548. 4

Question Number : 63 Question Id : 301698138 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Solution of Laplace's equation, which are continuous through the second derivative, are called

1. Bessel functions
2. Odd functions
3. Harmonic functions
4. Fundamental functions

Options :

301698549. 1
301698550. 2
301698551. 3
301698552. 4

Question Number : 64 Question Id : 301698139 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A rectangular waveguide $2.29 \text{ cm} \times 1.02 \text{ cm}$ operates at a frequency of 11 GHz and a cut-off frequency of 6.55 GHz in TE₁₀ mode. If the maximum potential gradient of the signal is 5 kV/cm, then the maximum power handling capacity of the waveguide will be

1. 31.11 mW
2. 31.11 W
3. 31.11 kW
4. 3.111 mW

Options :

301698553. 1
 301698554. 2
 301698555. 3
 301698556. 4

Question Number : 65 Question Id : 301698140 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The law/Theory and equations are given in the table below. Match **List-I** with **List-II**

LIST-I (Law/Theory)		LIST-II (Equation)	
(A)	Continuity equation	(I)	$\nabla \times \vec{j} = -\frac{\partial \vec{\rho}_v}{\partial t}$
(B)	Ampere's law	(II)	$\nabla \times \vec{H} = \vec{j} + \frac{\partial \vec{D}}{\partial t}$
(C)	Displacement current	(III)	$\vec{j} = \frac{\partial \vec{D}}{\partial t}$
(D)	Faraday's law	(IV)	$\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$

Choose the **correct** answer from the options given below:

1. A - I, B - II, C - III, D - IV
2. A - IV, B - I, C - II, D - III
3. A - IV, B - II, C - I, D - III
4. A - I, B - IV, C - III, D - II

Options :

301698557. 1
 301698558. 2

301698559. 3

301698560. 4

Question Number : 66 Question Id : 301698141 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

A plane wave whose electric field is given by $\vec{E} = 100 \cos(\omega t - 6\pi x) \hat{z}$ passes normally from a material 'A' having $\epsilon_r = 4, \mu_r = 1$ and $\sigma = 0$ to a material 'B' having $\epsilon_r = 9, \mu_r = 4$ and $\sigma = 0$. The values of some of its parameters are given below:

A. 6π B. 80π C. $\frac{1}{7}$ D. $\frac{8}{7}$

Choose the **correct** sequence: intrinsic impedance of medium , Reflection coefficient, Transmission Coefficient and Phase shift constant of medium, respectively, from the options given below:

1. A, C, D, B

2. A, C, B, D

3. B, A, D, C

4. C, B, D, A

Options :

301698561. 1

301698562. 2

301698563. 3

301698564. 4

Question Number : 67 Question Id : 301698142 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

In an impedance Smith chart, a clockwise movement along a constant resistance circle gives rise to

1. a decrease in the value of reactance
2. an increase in the value of reactance
3. no change in the reactance value
4. no change in the impedance value

Options :

301698565. 1
301698566. 2
301698567. 3
301698568. 4

Question Number : 68 Question Id : 301698143 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The input impedance of a $\frac{\lambda}{8}$ section of a lossless transmission line of the characteristic impedance 50Ω is found to be real when the other end is terminated by a load $Z_L = (R + jX) \Omega$. If X is 30Ω the value of R (in Ω) is

1. 40Ω
2. 50Ω
3. 80Ω
4. 100Ω

Options :

301698569. 1
301698570. 2
301698571. 3
301698572. 4

Question Number : 69 Question Id : 301698144 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider an air filled rectangular waveguide with dimensions $a = 2.286$ cm and $b = 1.016$ cm.

- A. TE_{10}
- B. TE_{01}
- C. TE_{20}
- D. TE_{11}

The increasing order of the cut-off frequencies for different modes is:
Choose the **correct** answer from the options given below:

- 1. A, B, C, D
- 2. A, C, B, D
- 3. B, A, D, C
- 4. C, B, D, A

Options :

- 301698573. 1
- 301698574. 2
- 301698575. 3
- 301698576. 4

Question Number : 70 Question Id : 301698145 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

IoT Communication Protocols and their architecture name are given in the following table. Match List-I (Protocol Name) with List-II (Architecture).

LIST-I (Protocol Name)		LIST-II (Architecture)	
A.	AMPQ	I.	Bus
B.	CoAP	II.	Client server
C.	DDS	III.	P2P
D.	XMPP	IV.	Tree

Choose the **correct** answer from the options given below:

- 1. A - I, B - II, C - III, D - IV
- 2. A - I, B - III, C - II, D - IV
- 3. A - I, B - II, C - IV, D - III
- 4. A - III, B - IV, C - I, D - II

Options :

- 301698577. 1
- 301698578. 2
- 301698579. 3
- 301698580. 4

Question Number : 71 Question Id : 301698146 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

_____ is a language for creating Web pages.

- 1. HTML
- 2. C++
- 3. C Shell
- 4. Perl

Options :

- 301698581. 1
- 301698582. 2
- 301698583. 3
- 301698584. 4

Question Number : 72 Question Id : 301698147 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

The commonly used operating systems for IoT devices are

- A. Contiki
- B. TinyOS
- C. Linux
- D. Nano-RK

Choose the **correct** answer from the options given below:

- 1. A, B and D only
- 2. A, B and C only
- 3. A, B, C and D
- 4. B, C and D only

Options :

- 301698585. 1
- 301698586. 2
- 301698587. 3

301698588. 4

Question Number : 73 Question Id : 301698148 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Communication Protocols that are currently used in IoT are:

- A. HTTP/Rest
- B. IPv6
- C. TCP
- D. MAC

The Communication Protocols used at each layer of IoT Network Stack : Application Layer, Transport Layer, Network Layer, Link Layer, respectively, in a sequence are
Choose the **correct** answer from the options given below:

- 1. A, B, C, D
- 2. A, C, B, D
- 3. B, A, D, C
- 4. C, B, D, A

Options :

- 301698589. 1
- 301698590. 2
- 301698591. 3
- 301698592. 4

Question Number : 74 Question Id : 301698149 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Which application allows a user to access and change remote files without actual transfer over a complete network?

- 1. TELNET
- 2. NFS
- 3. FTP
- 4. DNS

Options :

- 301698593. 1
- 301698594. 2
- 301698595. 3
- 301698596. 4

Question Number : 75 Question Id : 301698150 Question Type : MCQ Option Shuffling : No Display Question Number : Yes Is Question Mandatory : No

Correct Marks : 4 Wrong Marks : 1

Consider the following statements on TCP/IP

- A. At the physical and data link layers, TCP/IP does not define any specific protocol.
- B. At the internetwork layer, TCP/IP supports the Internetworking Protocol.
- C. At the transport layer, TCP/IP defines five protocols.

Choose the **correct** answer from the options given below:

- 1. A only
- 2. A and C only
- 3. A and B only
- 4. A, B and C

Options :

301698597. 1

301698598. 2

301698599. 3

301698600. 4