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DU MSc Electronics

Topic:- DU_J19_MSC_ELEC

1) The circuit used to store one bit of data is known as [Question ID = 15129]

1. Flip Flop [Option ID = 30514]
2. Encoder [Option ID = 30515]
3. Register [Option ID = 30513]
4. Decoder [Option ID = 30516]

Correct Answer :-

- Register [Option ID = 30513]

2) If the drift velocity of electrons under a field gradient of 1000 V/m is 4 m/s then their mobility is [Question ID = 15098]

1. 4×10^{-3} $m^2/V.s$ [Option ID = 30389]
2. 2×10^{-7} $m^2/V.s$ [Option ID = 30391]
3. 4×10^{-5} $cm^2/V.s$ [Option ID = 30392]
4. 16×10^{-6} $cm^2/V.s$ [Option ID = 30390]

Correct Answer :-

- 4×10^{-3} $m^2/V.s$ [Option ID = 30389]

3) Which of the following expressions of electric field represents elliptically polarized light?

[Question ID = 15151]

1. $E_0 \hat{x} e^{j(\omega t - \vec{k}.\vec{r})}$ [Option ID = 30603]
2. $E_0(\hat{x} + j\hat{y}) e^{j(\omega t - \vec{k}.\vec{r})}$ [Option ID = 30601]
3. $E_0(\hat{x} - j\hat{y}) e^{j(\omega t - \vec{k}.\vec{r})}$ [Option ID = 30602]
4. $(E_1\hat{x} + jE_2\hat{y}) e^{j(\omega t - \vec{k}.\vec{r})}$ [Option ID = 30604]

Correct Answer :-

- $E_0(\hat{x} + j\hat{y}) e^{j(\omega t - \vec{k}.\vec{r})}$ [Option ID = 30601]

4) In a series RL circuit, the application of a dc voltage results in a current 0.74 times the final steady state value of current after one second. However, after the current has reached its final value, the source is short circuited. What would be the value of the current after one second? [Question ID = 15112]

1. 0.05 I_o [Option ID = 30447]
2. 0.26 I_o [Option ID = 30448]
3. 0.52 I_o [Option ID = 30445]
4. 0.13 I_o [Option ID = 30446]

Correct Answer :-

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• 0.32 Ω [Option ID = 30445]

5) If absorption coefficient near the band edges of Si is ~ 10^3/cm then the minimum thickness of a sample which can absorb 90 % of incident light [Question ID = 15104]

1. 1.5×10^{-3} cm [Option ID = 30414]
2. 2.3×10^{-3} cm [Option ID = 30416]
3. 4.6×10^{-3} cm [Option ID = 30413]
4. 1.8×10^{-3} cm [Option ID = 30415]

Correct Answer :-

• 4.6×10^{-3} cm [Option ID = 30413]

6) Indicate which of the following logic gates can be used to realize all possible combinational Logic functions [Question ID = 15133]

1. EX OR gates only [Option ID = 30531]
2. NOR gates only [Option ID = 30532]
3. NAND and NOR gates Both [Option ID = 30530]
4. OR gates only [Option ID = 30529]

Correct Answer :-

• OR gates only [Option ID = 30529]

7) A band pass filter is called a wide band pass if the Q-factor is [Question ID = 15116]

1. equal to 10 [Option ID = 30462]
2. less than 10 [Option ID = 30461]
3. none of these [Option ID = 30464]
4. greater than 10 [Option ID = 30463]

Correct Answer :-

• less than 10 [Option ID = 30461]

8) Binary equivalent to decimal number 42.75

[Question ID = 15132]

1. 101010.11 [Option ID = 30526]
2. 10101011 [Option ID = 30528]
3. 101101.10 [Option ID = 30525]
4. 111001.11 [Option ID = 30527]

Correct Answer :-

• 101101.10 [Option ID = 30525]

9) In a wien-bridge oscillator, if the resistances in the positive feedback circuit are decreased then the frequency will be

[Question ID = 15123]

1. becomes zero [Option ID = 30492]
2. increases [Option ID = 30491]
3. decreases [Option ID = 30489]
4. remains the same [Option ID = 30490]

Correct Answer :-

• decreases [Option ID = 30489]

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10) The coil of a moving iron instrument has a resistance of 500 Ω and an inductance of 1 H. It reads 500 V when a 500 V dc is applied. If series resistance is 2000 Ω, its reading when fed by 500 V, 50 Hz ac will be [Question ID = 15105]

1. 490 V [Option ID = 30418]
2. 500 V [Option ID = 30419]
3. 505 V [Option ID = 30420]
4. 495 V [Option ID = 30417]

Correct Answer :-

- 495 V [Option ID = 30417]

11) The effect refers to a leakage current that flow over a surface path between the collector and emitter in transistors is [Question ID = 15101]

1. collector follower effect [Option ID = 30403]
2. channel effect [Option ID = 30404]
3. leakage effect [Option ID = 30401]
4. emitter effect [Option ID = 30402]

Correct Answer :-

- leakage effect [Option ID = 30401]

12) The complex number Z=x+iy which satisfy the equation $|Z+1|=1$ lie on [Question ID = 15072]

1. a circle with (1, 0) as a centre and radius 1 [Option ID = 30285]
2. a circle with (2, 0) as a centre and radius 1 [Option ID = 30287]
3. a circle with (0, 0) as a centre and radius 1 [Option ID = 30286]
4. a circle with (-1, 0) as a centre and radius 1 [Option ID = 30288]

Correct Answer :-

- a circle with (1, 0) as a centre and radius 1 [Option ID = 30285]

13) In a low-level AM system, amplifiers following the modulated stage must be [Question ID = 15169]

1. harmonic devices [Option ID = 30673]
2. linear devices [Option ID = 30674]
3. class C amplifiers [Option ID = 30675]
4. non-linear devices [Option ID = 30676]

Correct Answer :-

- harmonic devices [Option ID = 30673]

14) Frequency of a local oscillator in a AM standard broadcast receiver having an IF as 455 kHz and tuned to 540 kHz when the local oscillator tracks below the frequency of received signal [Question ID = 15167]

1. 955 kHz [Option ID = 30666]
2. 85 kHz [Option ID = 30668]
3. 75 kHz [Option ID = 30667]
4. 1450 kHz [Option ID = 30665]

Correct Answer :-

- 1450 kHz [Option ID = 30665]

15) A linear variable differential transformer (LVDT) feeds a voltmeter of 0-5 V range through a 250 gain amplifier. For a displacement 0.5 mm, the output of LVDT is 2 mV. The sensitivity of instrument is [Question ID = 15108]

1. 5 V/mm [Option ID = 30431]

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2. 0.1 V/mm [Option ID = 30432]
3. 1 V/mm [Option ID = 30430]
4. 0.5 V/mm [Option ID = 30429]

Correct Answer :-

- 0.5 V/mm [Option ID = 30429]

16) 11011 in gray code equal to binary

[Question ID = 15135]

1. $(11111)_2$ [Option ID = 30537]
2. $(11100)_2$ [Option ID = 30539]
3. $(10010)_2$ [Option ID = 30538]
4. $(10001)_2$ [Option ID = 30540]

Correct Answer :-

- $(11111)_2$ [Option ID = 30537]

17) If modulation index of an AM wave is increased from 1.5 to 2, then the transmitted power [Question ID = 15164]

1. remains same [Option ID = 30656]
2. increases by 51% [Option ID = 30655]
3. increases by 41% [Option ID = 30654]
4. increases by 20% [Option ID = 30653]

Correct Answer :-

- increases by 20% [Option ID = 30653]

18) If the variable count exceeds 1000, a single statement that prints "Too many" is

[Question ID = 15092]

1. if (count>1000) cout << "Too many"; [Option ID = 30365]
2. if (count>1000) cout >> "Too many"; [Option ID = 30367]
3. if (count<1000) cout << "Too many";
   [Option ID = 30366]
4. None of these [Option ID = 30368]

Correct Answer :-

- if (count>1000) cout << "Too many"; [Option ID = 30365]

19) If the clock frequency is 5 MHz, how much time is required to execute an instruction of 18 states:

[Question ID = 15144]

1. 20 msec [Option ID = 30576]
2. 90 msec [Option ID = 30575]
3. 3.6 msec [Option ID = 30574]
4. 18 msec [Option ID = 30573]

Correct Answer :-

- 18 msec [Option ID = 30573]

20) If two resistors $R_1 = 36\ \Omega \pm 5\%$ and $R_2 = 75\ \Omega \pm 5\%$ are connected in series then total resistance is_____

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1. 111 ± 0.1 Ω [Option ID = 30424]
2. 111 ± 10 Ω [Option ID = 30421]
3. 111 ± 2.5 Ω [Option ID = 30422]
4. 111 ± 5.55 Ω [Option ID = 30423]

Correct Answer :-

- 111 ± 10 Ω [Option ID = 30421]

21) In a Broadcast superheterodyne receiver, the [Question ID = 15165]

1. RF amplifier normally works at 455 kHz above the carrier frequency [Option ID = 30660]
2. local oscillator operates below the signal frequency [Option ID = 30657]
3. local oscillator frequency is normally double the IF [Option ID = 30658]
4. mixer input must be turned to the signal frequency [Option ID = 30659]

Correct Answer :-

- local oscillator operates below the signal frequency [Option ID = 30657]

22) The estimated internal pinch-off voltage for 0.7 μm thick n-channel GaAs JFET is 0.7 V. If the thickness of channel decreased by 20 % then the internal pinch-off voltage is _____ [Question ID = 15103]

1. 0.112 V [Option ID = 30412]
2. 0.448 V [Option ID = 30411]
3. 0.224 V [Option ID = 30410]
4. 0.896 V [Option ID = 30409]

Correct Answer :-

- 0.896 V [Option ID = 30409]

23) A sinusoidal carrier voltage of frequency 1 MHz and amplitude 100 volts is amplitude modulated by sinusoidal voltage of frequency 5 kHz producing 50% modulation. The frequency of lower and upper sideband terms are [Question ID = 15160]

1. 995 Hz and 1005 Hz [Option ID = 30637]
2. 995 MHz and 1005 MHz [Option ID = 30640]
3. 1000 kHz and 1005 kHz [Option ID = 30638]
4. 995 kHz and 1005 kHz [Option ID = 30639]

Correct Answer :-

- 995 Hz and 1005 Hz [Option ID = 30637]

24) A given conductor has a resistance of 2 Ω. What is the resistance of another conductor of the same material which has one half the diameter and three times the length of the given conductor [Question ID = 15111]

1. 24 Ω [Option ID = 30442]
2. 4 Ω [Option ID = 30444]
3. 12 Ω [Option ID = 30441]
4. 6 Ω [Option ID = 30443]

Correct Answer :-

- 12 Ω [Option ID = 30441]

25) For a network having resistors and independent sources, it is desired to obtain Thevenin equivalent across the load which is in parallel with an ideal current source. Then which of the following statement is true? [Question ID = 15115]

1. none of these [Option ID = 30460]

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2. the Thevenin equivalent circuit does not exist but the Norton equivalent does exist. [Option ID = 30459]
3. the Thevenin equivalent circuit is simply that of a voltage source. [Option ID = 30458]
4. the Thevenin equivalent circuit consists of a voltage source and a series resistor. [Option ID = 30457]

Correct Answer :-

- the Thevenin equivalent circuit consists of a voltage source and a series resistor. [Option ID = 30457]

26) Determine the Bandwidth of a FM wave when the maximum deviation allowed is 75 KHz and the modulating signal has a frequency of 10 KHz.

[Question ID = 15162]

1. 200 KHz [Option ID = 30646]
2. 170 KHz [Option ID = 30647]
3. 100 KHz [Option ID = 30645]
4. 1000 KHz [Option ID = 30648]

Correct Answer :-

- 100 KHz [Option ID = 30645]

27) The number of photons emitted per second from a 1 watt Argon laser operating at 488 nm is approximately [Question ID = 15086]

1. 10.23×10^{17} [Option ID = 30342]
2. 2.46×10^{18} [Option ID = 30344]
3. 10.23×10^{18} [Option ID = 30341]
4. 2.46×10^{15} [Option ID = 30343]

Correct Answer :-

- 10.23×10^{18} [Option ID = 30341]

28) A Hall effect transducer has Hall coefficient K_H = - 1 x 10^{-8}. If magnetic field intensity B = 1 Wb/m^2, current I = 3 A and bismuth slab is 2 mm wide, the Hall voltage is

[Question ID = 15109]

1. - 0.6 nV [Option ID = 30434]
2. - 7.5 µV [Option ID = 30435]
3. - 6.6 pV [Option ID = 30436]
4. - 15 µV [Option ID = 30433]

Correct Answer :-

- - 15 µV [Option ID = 30433]

29) For a 10 mV change in a common mode of op-amp OPA76, which has CMRR = 60 dB, the change in offset voltage is [Question ID = 15125]

1. 100 µV [Option ID = 30497]
2. 0.1 µV [Option ID = 30499]
3. 10 µV [Option ID = 30498]
4. 1µV [Option ID = 30500]

Correct Answer :-

- 100 µV [Option ID = 30497]

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30) Consider sinusoidal modulation in an AM systems. Assuming no over modulation, the modulation index (μ) when the maximum and minimum values of the envelope, respectively, are 4 V and 2 V is

[Question ID = 15173]

1. 0.11 [Option ID = 30691]
2. 0.44 [Option ID = 30689]
3. 0.33 [Option ID = 30692]
4. 0.22 [Option ID = 30690]

Correct Answer :-

- 0.44 [Option ID = 30689]

31) In silicon photodiode, for field above 10^7 V/m, holes have a saturation velocity of about 10^5 m/s. calculate the transit time in a depletion layer of 5 μm thick. [Question ID = 15099]

1. 1.5×10^{-12} s [Option ID = 30396]
2. 2.5×10^{-9} s [Option ID = 30393]
3. 2.5×10^{-14} s [Option ID = 30394]
4. 5.0×10^{-11} s [Option ID = 30395]

Correct Answer :-

- 2.5×10^{-9} s [Option ID = 30393]

32) If a non-inductive resistor of 12 Ω, an inductor of 0.2 H and a capacitor of 9 μF are connected in series then the resonance frequency circuit is [Question ID = 15113]

1. 30 Hz [Option ID = 30449]
2. 60 Hz [Option ID = 30452]
3. 220 Hz [Option ID = 30450]
4. 119 Hz [Option ID = 30451]

Correct Answer :-

- 30 Hz [Option ID = 30449]

33) A half wave diode circuit using ideal diode has an input voltage $20\sin\omega t$ V. Then average and rms values of output voltage are

[Question ID = 15170]

1. $\frac{20}{\pi}$ V and 5 V [Option ID = 30678]
2. $\frac{10}{\pi}$ V and 5 V [Option ID = 30677]
3. $\frac{20}{\pi}$ V and 10 V [Option ID = 30680]
4. $\frac{10}{\pi}$ V and 10 V [Option ID = 30679]

Correct Answer :-

- $\frac{10}{\pi}$ V and 5 V [Option ID = 30677]

34)

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In C language, what is the output of the following code

```
void  main( )
{
int x[ ]= {111,222,333,444,555};
printf ("\n %d %d %d %d %d",1[x],x[0],x[4],3[x],x[2]);

}
```

[Question ID = 15094]

1. 111 222 333 444 555 [Option ID = 30373]
2. Error [Option ID = 30375]
3. None of these [Option ID = 30376]
4. 222 111 555 444 333 [Option ID = 30374]

Correct Answer :-

- 111 222 333 444 555 [Option ID = 30373]

35) In C language, what is the output of the following code

```
main ( )
 { float a = 0.5, b = 0.7;
 if (b < 0.8)
   if (a < 0.5)
     printf (“XYZ”);
   else
      printf (“PQR”);
 else printf (“ABC”);
 }
```

[Question ID = 15093]

1. PQR [Option ID = 30370]
2. XYZ [Option ID = 30371]
3. None of these [Option ID = 30372]
4. ABC [Option ID = 30369]

Correct Answer :-

- ABC [Option ID = 30369]

36) In C language, what is the output of the following code

```
int main()
{

int i =5 , j=4;
 j = ++i+i++;
 i*=j;
 printf("%d %d",i,j);

}
```

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1. 90 30 [Option ID = 30383]
2. 60 31 [Option ID = 30382]
3. 180 20 [Option ID = 30384]
4. 91 13 [Option ID = 30381]

Correct Answer :-

- 91 13 [Option ID = 30381]

37) In C language, what is the output of the following code

```
void main()
{
int x;
x = 7;
while ( x > 1)
{
printf("%d",x);
x=x-1;
}
}
```

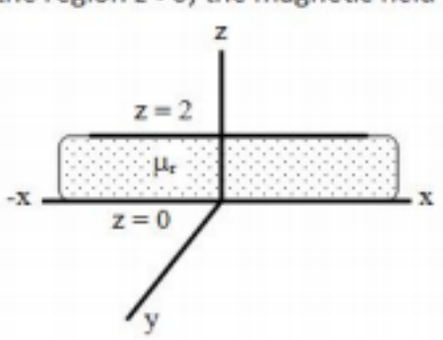
[Question ID = 15095]

1. 54321 [Option ID = 30378]
2. 765432 [Option ID = 30380]
3. 0 [Option ID = 30379]
4. 234567 [Option ID = 30377]

Correct Answer :-

- 234567 [Option ID = 30377]

38) The region $0 \le z \le 2$ is filled with an infinite slab of magnetic material ($\mu_r = 2.5$). the surface of the slab at z = 0 and z = 2, respectively carry surface current 30 $\hat{u}_x$ A/m and -40 $\hat{u}_x$ A/m as shown in the Fig. In the region $z < 0$, the magnetic field H is,



[Question ID = 15155]

1. -10 $\hat{u}_y$ A/m [Option ID = 30620]
2. -5 $\hat{u}_y$ A/m [Option ID = 30617]
3. 10 $\hat{u}_y$ A/m [Option ID = 30619]
4. 5 $\hat{u}_y$ A/m [Option ID = 30618]

Correct Answer :-

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- $-5\,\hat{u}_r$ A/m [Option ID = 30617]

39) If the displacement vector is given by $\vec{D} = 5x\hat{i} - 2y\hat{j} + Kz\hat{z}$ μC/m² in a charge free perfect dielectric, the value of K is

[Question ID = 15148]

1. $-3\ \mu C/m^3$ [Option ID = 30590]
2. $2\ \mu C/m^3$ [Option ID = 30592]
3. $3\ \mu C/m^3$ [Option ID = 30589]
4. $-2\ \mu C/m^3$ [Option ID = 30591]

Correct Answer :-

- $3\ \mu C/m^3$ [Option ID = 30589]

40) The matrix $A = \begin{bmatrix} 1 & 0 \\ 2 & 4 \end{bmatrix}$ is given, the eigen values of $4A^{-1} + 3A + 2I$ are

[Question ID = 15077]

1. 7, 15 [Option ID = 30305]
2. 6, 15 [Option ID = 30306]
3. 9, 15 [Option ID = 30308]
4. 9, 12 [Option ID = 30307]

Correct Answer :-

- 7, 15 [Option ID = 30305]

41) The solution of given first order differential equation $\dot{x}(t) = -3\,x(t)$ at $x(0) = x_0$ is

[Question ID = 15071]

1. $x = e^{-t/3}x_0$ [Option ID = 30284]
2. $x = e^{tx_0/3}$ [Option ID = 30283]
3. $x = e^{3t}x_0$ [Option ID = 30281]
4. $x = e^{-3t}x_0$ [Option ID = 30282]

Correct Answer :-

- $x = e^{3t}x_0$ [Option ID = 30281]

42) The medium 1 and 2 are having the relative permittivity ε_1 and ε_2, respectively, then Brewster's angle θ_B is given as,

[Question ID = 15156]

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1. $\tan\theta_B = 2\sqrt{\varepsilon_1\varepsilon_2}$ [Option ID = 30624]
2. $\tan\theta_B = \sqrt{\varepsilon_1\varepsilon_2}$ [Option ID = 30623]
3. $\tan\theta_B = \sqrt{\frac{\varepsilon_1}{\varepsilon_2}}$ [Option ID = 30621]
4. $\tan\theta_B = \sqrt{\frac{\varepsilon_2}{\varepsilon_1}}$ [Option ID = 30622]

Correct Answer :-

- $\tan\theta_B = \sqrt{\frac{\varepsilon_1}{\varepsilon_2}}$ [Option ID = 30621]

43) The value of integral $\int_0^{2\pi}\int_0^{\pi/3}\int_0^1 r^2 \sin\emptyset \, dr d\emptyset d\theta$ = _____

[Question ID = 15076]

1. $\frac{\pi}{2}$ [Option ID = 30302]
2. π [Option ID = 30304]
3. 1 [Option ID = 30303]
4. $\frac{\pi}{3}$ [Option ID = 30301]

Correct Answer :-

- $\frac{\pi}{3}$ [Option ID = 30301]

44) The particular integral for the differential equation $(D^2 - 7D + 6) = e^{2x}$ will be

[Question ID = 15078]

1. e^{2x} [Option ID = 30309]
2. $-\frac{1}{x}e^{2x}$ [Option ID = 30311]
3. $-\frac{1}{4}e^{2x}$ [Option ID = 30310]
4. $\frac{1}{4}e^{-x}$ [Option ID = 30312]

Correct Answer :-

- e^{2x} [Option ID = 30309]

45) What is the emission wavelength from an LED made with by using a III-V alloy semiconductor $In_{1-x}Ga_xAs_yP_{1-y}$ with bandgap 0.8 eV?

[Question ID = 15087]

1. 1550 nm [Option ID = 30346]
2. 645 nm [Option ID = 30345]

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3. $1550\ \mu m$ [Option ID = 30347]
4. $645\ \mu m$ [Option ID = 30348]

Correct Answer :-

- 645 nm [Option ID = 30345]

46)

The value of the integral $\int_0^1 \frac{2x}{1+x^2}\,dx$ when evaluated by Simpson's rule with $h=\frac{1}{2}$ is obtained as

[Question ID = 15084]

1. $\frac{1}{2}$ [Option ID = 30335]
2. $\frac{7}{10}$ [Option ID = 30333]
3. $\ln 2$ [Option ID = 30336]
4. $\frac{3}{10}$ [Option ID = 30334]

Correct Answer :-

- $\frac{7}{10}$ [Option ID = 30333]

47) Let $P_n(x)$ be the Legendre polynomial. Then $P_n'(-x)$ is equal to

[Question ID = 15079]

1. $(-1)^n P_n'(x)$ [Option ID = 30313]
2. $(-1)^n P_n(x)$ [Option ID = 30315]
3. $P_n''(x)$ [Option ID = 30316]
4. $(-1)^{n+1} P_n'(x)$ [Option ID = 30314]

Correct Answer :-

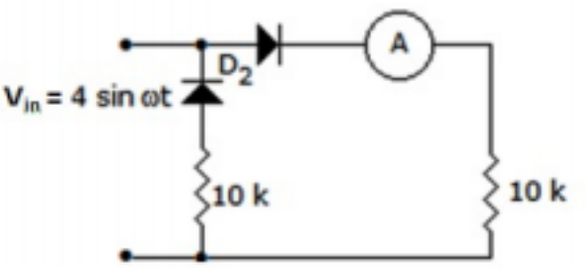
- $(-1)^n P_n'(x)$ [Option ID = 30313]

48)

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In the circuit of the given figure, assume that the diodes are ideal and the meter is an average indicating ammeter, the ammeter will read the current as



[Question ID = 15127]

1. $\frac{0.8}{\pi}$ mA [Option ID = 30507]
2. 0.2 mA [Option ID = 30506]
3. $\frac{0.4}{\pi}$ mA [Option ID = 30505]
4. 0.4 mA [Option ID = 30508]

Correct Answer :-

- $\frac{0.4}{\pi}$ mA [Option ID = 30505]

49) If Laplace transform of $f(t)$ is $F(s)$ then Laplace transform of $f(t-T)$ is equal to

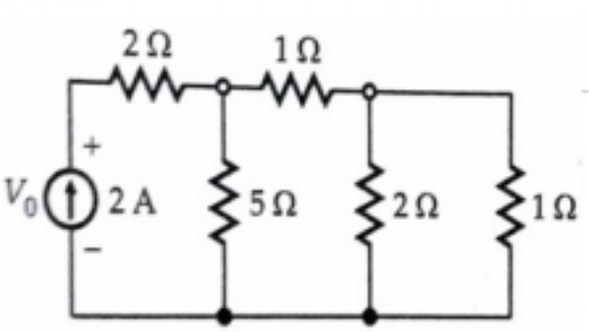
[Question ID = 15073]

1. $e^{-sT}/F(s)$ [Option ID = 30292]
2. $e^{sT}F(s)$ [Option ID = 30289]
3. $e^{sT}/F(s)$ [Option ID = 30290]
4. $e^{-sT}F(s)$ [Option ID = 30291]

Correct Answer :-

- $e^{sT}F(s)$ [Option ID = 30289]

50) In the circuit shown below V_o is given as



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[Question ID = 15214]

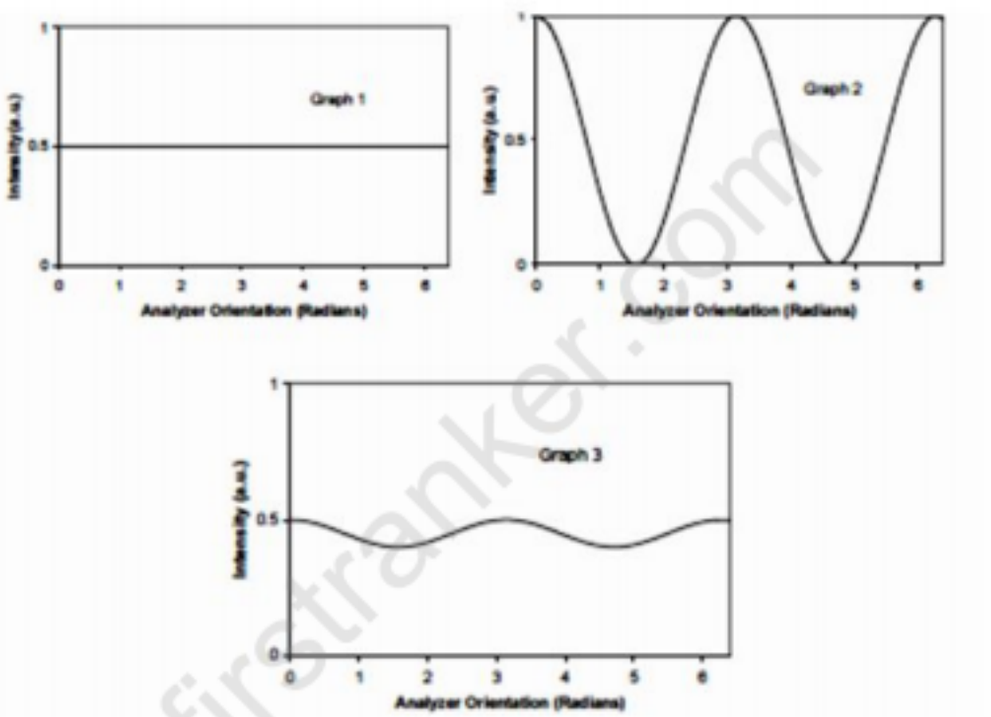
1. 2 V [Option ID = 30454]
2. 6.5 V [Option ID = 30455]
3. 1 V [Option ID = 30456]
4. 3 V [Option ID = 30453]

Correct Answer :-

- 3 V [Option ID = 30453]

51)

Intensity of three different light beams after passing through an analyzer is found to vary as shown in the following graphs. Identify the option giving the correct states of polarization of the incident beams from the graphs



[Question ID = 15091]

1. Graph 1: Circular, Graph 2: Linear, Graph 3: Elliptic [Option ID = 30362]
2. Graph 1: Unpolarized, Graph 2: Circular, Graph 3: Linear [Option ID = 30363]
3. Graph 1: Linear, Graph 2: Circular, Graph 3: Elliptic [Option ID = 30361]
4. Graph 1: Linear, Graph 2: Elliptic, Graph 3: Circular [Option ID = 30364]

Correct Answer :-

- Graph 1: Linear, Graph 2: Circular, Graph 3: Elliptic [Option ID = 30361]

52)

When the amplitude of the magnetic field in a plane wave is 2A/m in a medium characterized by, $\sigma = 0$, $\mu = \mu_0$ and $\varepsilon = 4\varepsilon_0$, the magnitude of the electric field for the plane wave in this medium will be,

[Question ID = 15153]

1. 20π V/m [Option ID = 30612]
2. 120π V/m [Option ID = 30611]

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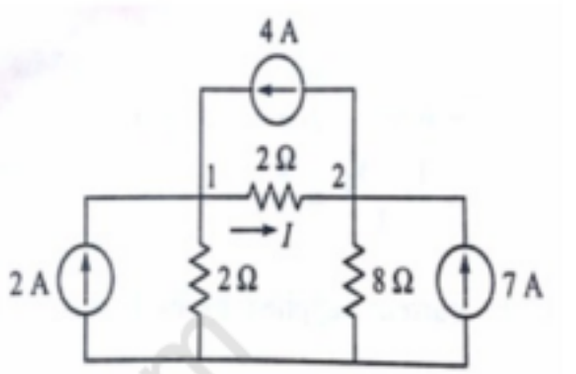
3. 80π V/m [Option ID = 30610]
4. 60π V/m [Option ID = 30609]

Correct Answer :-

- 60π V/m [Option ID = 30609]

53)

The value of *I* in the circuit shown in the figure is



[Question ID = 15110]

1. -0.2 A [Option ID = 30438]
2. 1 A [Option ID = 30439]
3. 2 A [Option ID = 30440]
4. -0.5 A [Option ID = 30437]

Correct Answer :-

- -0.5 A [Option ID = 30437]

54)

The number of products terms in the minimized sum-of-product expression obtained through the following K-map is (where, "d" denotes don't care states)

1	0	0	1
0	d	0	0
0	0	d	1
1	0	0	1

[Question ID = 15137]

1. 2 [Option ID = 30548]
2. 5 [Option ID = 30545]
3. 3 [Option ID = 30546]
4. 4 [Option ID = 30547]

Correct Answer :-

- 5 [Option ID = 30545]

55)

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Solve $\frac{dy}{dx} + \frac{y}{x} = \frac{\cos x}{x}$

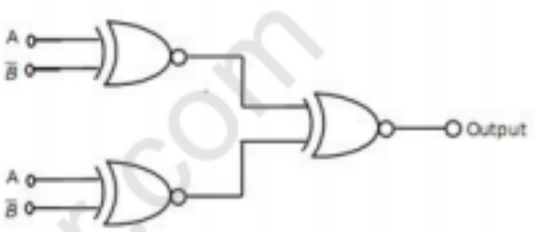
[Question ID = 15074]

1. $\frac{x}{y} = \sin x + c$ [Option ID = 30293]
2. $\sec x = \sin x + c$ [Option ID = 30295]
3. $\sin x \cos x = lnx$ [Option ID = 30296]
4. $xy = \sin x + c$ [Option ID = 30294]

Correct Answer :-

- $\frac{x}{y} = \sin x + c$ [Option ID = 30293]

56) The output of the circuit shown in figure is equal to



[Question ID = 15130]

1. $\bar{A}B + A\bar{B}$ [Option ID = 30518]
2. 0 [Option ID = 30517]
3. AB [Option ID = 30520]
4. 1 [Option ID = 30519]

Correct Answer :-

- 0 [Option ID = 30517]

57) The Boolean expression $(X + Y)(X + \bar{Y})(\bar{X} + Y)$ is equivalent to

[Question ID = 15131]

1. XY [Option ID = 30521]
2. $\bar{X}Y$ [Option ID = 30523]
3. $X\bar{Y}$ [Option ID = 30522]
4. $\overline{XY}$ [Option ID = 30524]

Correct Answer :-

- XY [Option ID = 30521]

58) If $\alpha = 0.98$, $I_{CO} = 6\mu A$, $I_B = 100\mu A$ for a transistor, then the value of I_C will be

[Question ID = 15120]

1. 4.6 mA [Option ID = 30480]

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3. 3.2 mA [Option ID = 30479]
4. 2.3 mA [Option ID = 30478]

Correct Answer :-

- 5.2 mA [Option ID = 30477]

59)

If V_B is the built-in potential and $\pm V_A$ is the applied voltage (positive sign for reverse bias and negative sign for forward bias), then the junction capacitance of an abrupt p-n junction is proportional to

[Question ID = 15118]

1. $(V_B \pm V_A)^{-1/3}$ [Option ID = 30472]
2. $(V_B \pm V_A)$ [Option ID = 30471]
3. $(V_B \pm V_A)^{1/2}$ [Option ID = 30470]
4. $(V_B \pm V_A)^{-1/2}$ [Option ID = 30469]

Correct Answer :-

- $(V_B \pm V_A)^{-1/2}$ [Option ID = 30469]

60)

If a Coulomb's force, F= $3\hat{u}_x + 4\hat{u}_y$ Newton is acting on a charge of 10 coulomb, the magnitude of the electric field will be,

[Question ID = 15157]

1. 10 V/m [Option ID = 30625]
2. 0.5 V/m [Option ID = 30627]
3. 7 V/m [Option ID = 30626]
4. 1.2 V/m [Option ID = 30628]

Correct Answer :-

- 10 V/m [Option ID = 30625]

61)

For a certain JFET, $I_{DSS} = 10\,nA$ at $V_{GS} = 10V$. The input resistance is

[Question ID = 15119]

1. 100 MΩ [Option ID = 30474]
2. 1 MΩ [Option ID = 30475]
3. 1000 MΩ [Option ID = 30473]
4. 10,000 MΩ [Option ID = 30476]

Correct Answer :-

- 1000 MΩ [Option ID = 30473]

62)

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A magnetic field $\vec{H} = H_0 \cos 2x \sin(\omega t - \beta y)\hat{k}$ exists within a dielectric of permittivity ε. The corresponding displacement current density is given by

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[Question ID = 15150]

1. $-\beta H_0 \cos 2x \sin(\omega t - \beta y)\hat{i}$ [Option ID = 30599]
2. $-\beta H_0 \cos 2x \sin(\omega t - \beta y)\hat{k}$ [Option ID = 30600]
3. $-\beta H_0 \cos 2x \cos(\omega t - \beta y)\hat{k}$ [Option ID = 30597]
4. $-\omega H_0 \cos 2x \sin(\omega t - \beta y)\hat{k}$ [Option ID = 30598]

Correct Answer :-

- $-\beta H_0 \cos 2x \cos(\omega t - \beta y)\hat{k}$ [Option ID = 30597]

63) Find the correct match between group-I and group-II

Group – I Compound Semiconductors	Group-II Band gap range (eV)
P. GaAs	1. 1.40 – 1.55
Q. InGaAsP	2. 0.73 – 1.35
R. InGaAs	3. 0.95 – 1.24
S. AlGaAs	4. 1.39

[Question ID = 15102]

1. P->4, Q->2, R->3 S->1 [Option ID = 30405]
2. P->4, Q->1, R->3 S->2 [Option ID = 30407]
3. P->4, Q->3, R->1 S->2 [Option ID = 30408]
4. P->4, Q->3, R->2 S->1 [Option ID = 30406]

Correct Answer :-

- P->4, Q->2, R->3 S->1 [Option ID = 30405]

64) The solution of the following differential equation is given by

$$x^2 \frac{d^2y}{dx^2} + x\frac{dy}{dx} + (x^2 - n^2)y = 0$$

[Question ID = 15081]

1. Laguerre Polynomial $L_n(x)$ [Option ID = 30324]
2. Bessel Function $J_n(x)$ [Option ID = 30321]
3. Legendre Polynomial $P_n(x)$ [Option ID = 30323]
4. Hermite Polynomial $H_n(x)$ [Option ID = 30322]

Correct Answer :-

- Bessel Function $J_n(x)$ [Option ID = 30321]

65)

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If the potential in free space is given by $V = 2x^3 - 3y^2$, the charge density at the point (3,0) is given by

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[Question ID = 15149]

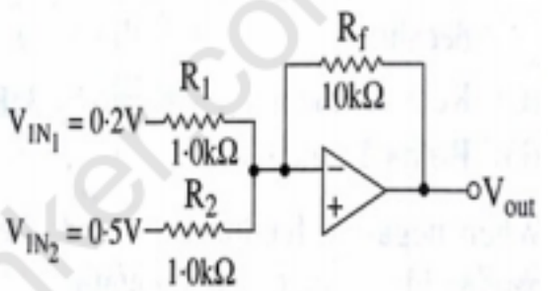
1. $-4\varepsilon_0$ [Option ID = 30595]
2. $-8\varepsilon_0$ [Option ID = 30596]
3. $4\varepsilon_0$ [Option ID = 30593]
4. $8\varepsilon_0$ [Option ID = 30594]

Correct Answer :-

- $4\varepsilon_0$ [Option ID = 30593]

66)

The output voltage for the summing amplifier shown in the figure is



[Question ID = 15122]

1. -7 V [Option ID = 30485]
2. -5 V [Option ID = 30488]
3. 7 V [Option ID = 30486]
4. 5 V [Option ID = 30487]

Correct Answer :-

- -7 V [Option ID = 30485]

67)

For a FM signal v (t) = 20 cos (10 * 10^8t + 30 sin 3000t), calculate the power dissipated by the FM wave in a 20Ω resistor.

[Question ID = 15163]

1. 10 Watts [Option ID = 30650]
2. 100 Watts [Option ID = 30649]
3. 200 Watts [Option ID = 30651]
4. 20 Watts [Option ID = 30652]

Correct Answer :-

- 100 Watts [Option ID = 30649]

68)

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A spherical volume described by $r \leq a$ contains a uniform charge density ρ. The electric field density $\vec{D}$ in the region $r > a$ will be

[Question ID = 15147]

1. $\frac{\rho a^2}{3r^2}\hat{r}$ [Option ID = 30588]
2. $\frac{\rho a^3}{3r^2}\hat{r}$ [Option ID = 30585]
3. $\frac{\rho a^3}{3r}\hat{r}$ [Option ID = 30586]
4. $\frac{\rho a}{3r}\hat{r}$ [Option ID = 30587]

Correct Answer :-

- $\frac{\rho a^3}{3r^2}\hat{r}$ [Option ID = 30585]

69)

Given that the Laplace transform of $f(t) = \frac{\sin t}{t}$ is $\tan^{-1}\left(\frac{1}{s}\right)$, the Laplace transform of $f(t) = \frac{\sin 2t}{t}$ is

[Question ID = 15083]

1. $\tan^{-1}\left(\frac{2}{s}\right)$ [Option ID = 30331]
2. $\tan^{-1}\left(\frac{1}{2s}\right)$ [Option ID = 30332]
3. $\tan^{-1}(2s)$ [Option ID = 30330]
4. $\tan^{-1}\left(\frac{s}{2}\right)$ [Option ID = 30329]

Correct Answer :-

- $\tan^{-1}\left(\frac{s}{2}\right)$ [Option ID = 30329]

70)

A plane wave is propagating in a non-magnetic medium with $\varepsilon_r = 4$. The intrinsic impedance of the medium is

[Question ID = 15154]

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2. 150 Ω [Option ID = 30613]
3. 377Ω [Option ID = 30615]
4. 120 Ω [Option ID = 30614]

Correct Answer :-

- 150 Ω [Option ID = 30613]

71) If $\vec{A} = \hat{i}x$ and $\vec{B} = \hat{j}y$ then $\vec{\nabla}(\vec{A} \bullet \vec{B})$ is equal to

[Question ID = 15075]

1. $\hat{i}y + \hat{j}x$ [Option ID = 30298]
2. 0 [Option ID = 30300]
3. $\frac{1}{2}yx^2\hat{i} + \frac{1}{2}xy^2\hat{j}$ [Option ID = 30299]
4. 2 [Option ID = 30297]

Correct Answer :-

- 2 [Option ID = 30297]

72) For a magnetic field $\vec{B} = -z\hat{i} + (x - y)\hat{j}$ the ϕ component of the vector in cylindrical coordinates will be

[Question ID = 15152]

1. $z\cos\phi + (x - y)\sin\phi$ [Option ID = 30606]
2. $-z\cos\phi + (x - y)\sin\phi$ [Option ID = 30605]
3. $z\sin\phi + (x - y)\cos\phi$ [Option ID = 30607]
4. $-z\sin\phi + (x - y)\sin\phi$ [Option ID = 30608]

Correct Answer :-

- $-z\cos\phi + (x - y)\sin\phi$ [Option ID = 30605]

73) In the following circuit the output Z is



[Question ID = 15128]

1. $\overline{ABC}$ [Option ID = 30512]
2. $A\bar{B}$ [Option ID = 30510]
3. $\bar{A}B$ [Option ID = 30511]
4. ABC [Option ID = 30509]

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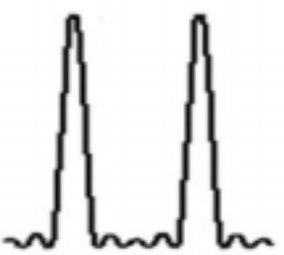
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Correct Answer :-

- ABC [Option ID = 30509]

74)

The figure shows a part of the typical far field diffraction pattern obtained when collimated light is incident normally on a N-slit diffraction grating. The number of slits N is



[Question ID = 15089]

1. 5 [Option ID = 30353]
2. 3 [Option ID = 30354]
3. cannot be estimated [Option ID = 30356]
4. 4 [Option ID = 30355]

Correct Answer :-

- 5 [Option ID = 30353]

75)

The value of n so that the vectors $2\hat{i}+3\hat{j}-2\hat{k}$, $5\hat{i}+n\hat{j}+\hat{k}$ and $-\hat{i}+2\hat{j}+3\hat{k}$ are coplanar is

[Question ID = 15080]

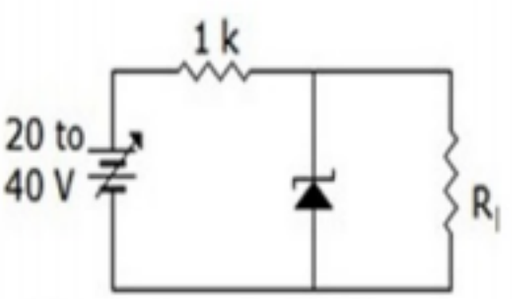
1. 28 [Option ID = 30319]
2. 18 [Option ID = 30318]
3. 9 [Option ID = 30320]
4. 36 [Option ID = 30317]

Correct Answer :-

- 36 [Option ID = 30317]

76)

A 10 V Zener diode is connected with a variable voltage supply as shown in Fig. The minimum and maximum current through series resistance are



[Question ID = 15124]

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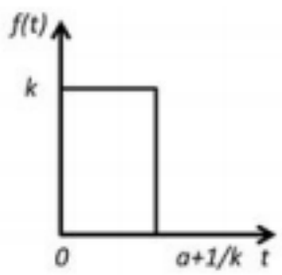
1. 20 mA and 40 mA [Option ID = 30493]
2. 0 and 40 mA [Option ID = 30496]
3. 0 and 30 mA [Option ID = 30494]
4. 10 mA and 30 mA [Option ID = 30495]

Correct Answer :-

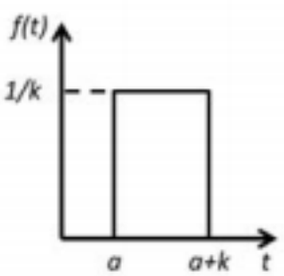
- 20 mA and 40 mA [Option ID = 30493]

77) Which of the following represents the function $f(t) = \frac{1}{k}\{u(t-a) - u[t-(a+k)]\}$?

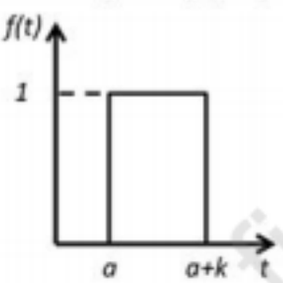
[Question ID = 15082]

1. 

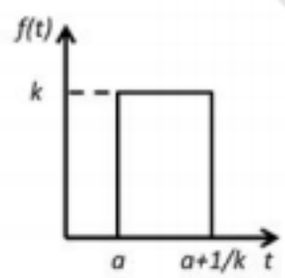
[Option ID = 30327]

2. 

[Option ID = 30328]

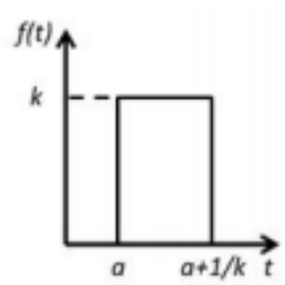
3. 

[Option ID = 30326]

4. 

[Option ID = 30325]

Correct Answer :-

- 

[Option ID = 30325]

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78) A message signal $m(t) = \cos(2\times 10^3 \pi t) + 4\cos(6\times 10^3 \pi t)$ modulates the carriers $c(t) = \cos(2\pi f_c t)$ where $f_c = 2$ MHz to produce an AM signal. For demodulating the generated AM signal using an envelope detector, the time constant RC of the detector circuit should satisfy

[Question ID = 15159]

1. RC >> 15 *ms* [Option ID = 30635]
2. RC<<18 *μs* [Option ID = 30634]
3. 0.5 *μs* < RC < 0.33 *ms* [Option ID = 30636]
4. 9 *ms*< RC< 1 *ms* [Option ID = 30633]

Correct Answer :-

- 9 *ms*< RC< 1 *ms* [Option ID = 30633]

79) The Nyquist sampling rate for the signal $s(t) = \frac{\sin(40\pi t)}{\pi t} \times \frac{\sin(60\pi t)}{\pi t}$ is given by

[Question ID = 15158]

1. 50 Hz [Option ID = 30631]
2. 100 Hz [Option ID = 30632]
3. 140 Hz [Option ID = 30629]
4. 120 Hz [Option ID = 30630]

Correct Answer :-

- 140 Hz [Option ID = 30629]

80) For what value of b does the following system of homogeneous equations have non-trivial solutions

$$2x + y + 2z = 0$$
$$x + y + 3z = 0$$
$$4x + 3y + bz = 0$$

[Question ID = 15085]

1. 9 [Option ID = 30340]
2. 12 [Option ID = 30338]
3. 8 [Option ID = 30337]
4. 4 [Option ID = 30339]

Correct Answer :-

- 8 [Option ID = 30337]

81) A 50 kW carrier is to be modulated to a level of 80%. The total sideband power is [Question ID = 15161]

1. 32 kW [Option ID = 30642]
2. 64 kW [Option ID = 30644]
3. 16 kW [Option ID = 30641]
4. 25 kW [Option ID = 30643]

Correct Answer :-

- 16 kW [Option ID = 30641]

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82) The sensor RAM acts as 8-byte first-in-first-out RAM in [Question ID = 15145]

1. keyboard and strobed input mode [Option ID = 30579]
2. keyboard mode [Option ID = 30580]
3. scanned sensor matrix mode [Option ID = 30577]
4. strobed input mode [Option ID = 30578]

Correct Answer :-

- scanned sensor matrix mode [Option ID = 30577]

83) For a two-port network to be reciprocal

[Question ID = 15117]

1. $y_{21}=y_{12}$ [Option ID = 30467]
2. $h_{21}=h_{12}$ [Option ID = 30466]
3. $Z_{11}=Z_{22}$ [Option ID = 30465]
4. AD-BC=0 [Option ID = 30468]

Correct Answer :-

- $Z_{11}=Z_{22}$ [Option ID = 30465]

84) In Young's double slit experiment, if the distance between the two holes is 0.5 mm and on a screen at a distance of 50 cm the fringe width is obtained as 0.5 mm, the wavelength used is [Question ID = 15088]

1. $500\,\mu m$ [Option ID = 30351]
2. $0.5\ nm$ [Option ID = 30349]
3. $633\,\mu m$ [Option ID = 30352]
4. $500\ nm$ [Option ID = 30350]

Correct Answer :-

- $0.5\ nm$ [Option ID = 30349]

85) In Young's double slit experiment using monochromatic light of wavelength λ the path difference corresponding to any point half the peak intensity is [Question ID = 15090]

1. $(2n+1)\frac{\lambda}{4}$ [Option ID = 30357]
2. $(2n+1)\frac{\lambda}{8}$ [Option ID = 30359]
3. $(2n+1)\frac{\lambda}{2}$ [Option ID = 30358]
4. $(2n+1)\frac{\lambda}{16}$ [Option ID = 30360]

Correct Answer :-

- $(2n+1)\frac{\lambda}{4}$ [Option ID = 30357]

86) Consider the following instructions executed in 8086.
PUSH AX; AX has 40 Hex in it
PUSH BX; BX has 18 Hex in it

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POP ASC
POP G
The value stored in G would be: [Question ID = 15139]

1. 12 Hex [Option ID = 30555]
2. 40 Hex [Option ID = 30554]
3. 68 Hex [Option ID = 30556]
4. 28 Hex [Option ID = 30553]

Correct Answer :-

- 28 Hex [Option ID = 30553]

87) The range of signed decimal number that can be represented by 6-bit 1's complement number is [Question ID = 15134]

1. -31 to +31 [Option ID = 30535]
2. -64 to +63 [Option ID = 30534]
3. -63 to +63 [Option ID = 30533]
4. -32 to 31 [Option ID = 30536]

Correct Answer :-

- -63 to +63 [Option ID = 30533]

88) In a 100% amplitude modulated signal, the power in the upper side band when carrier power is to be 100 W and modulation system SSBSC, is [Question ID = 15166]

1. 25 W [Option ID = 30664]
2. 66 W [Option ID = 30662]
3. 50 W [Option ID = 30663]
4. 100 W [Option ID = 30661]

Correct Answer :-

- 100 W [Option ID = 30661]

89) Which of the following flags in 8086 microprocessor get affected by the instruction CMP? [Question ID = 15138]

1. trap Flag [Option ID = 30549]
2. carry Flag [Option ID = 30552]
3. sign Flag [Option ID = 30551]
4. parity Flag [Option ID = 30550]

Correct Answer :-

- trap Flag [Option ID = 30549]

90) Which of the following instructions of an 8086 microprocessor uses the content of a CX register as a counter? [Question ID = 15140]

1. LDA [Option ID = 30559]
2. LOOP [Option ID = 30557]
3. CALL [Option ID = 30560]
4. LOCK [Option ID = 30558]

Correct Answer :-

- LOOP [Option ID = 30557]

91) Which one of the following mode is required for 8253 to generate a square wave? [Question ID = 15143]

1. MODE 1 [Option ID = 30570]
2. MODE 2 [Option ID = 30571]

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4. MODE 3 [Option ID = 30572]

Correct Answer :-

- MODE 4 [Option ID = 30569]

92) Which one of the following interrupts is both level and edge sensitive? [Question ID = 15142]

1. TRAP [Option ID = 30567]
2. RST 7.5 [Option ID = 30565]
3. INTR [Option ID = 30568]
4. RST 6.5 [Option ID = 30566]

Correct Answer :-

- RST 7.5 [Option ID = 30565]

93) A single phase energy meter has the rating 1200 resolutions/ kWh. If a 500 W electric gadget is used for 4 hours, the energy meter will make [Question ID = 15107]

1. 600 resolutions [Option ID = 30425]
2. 2400 resolutions [Option ID = 30427]
3. 4800 resolutions [Option ID = 30428]
4. 1200 resolutions [Option ID = 30426]

Correct Answer :-

- 600 resolutions [Option ID = 30425]

94) If built-in potential barrier of 0.92 V for silicon p-n junction with total space charge region width of 0.75 μm then the maximum electric field present in the metallurgical junction is ___ [Question ID = 15100]

1. -1 V/cm [Option ID = 30399]
2. -2.45×10^4 V/cm [Option ID = 30398]
3. -1.22×10^4 V/cm [Option ID = 30400]
4. -6.60×10^3 V/cm [Option ID = 30397]

Correct Answer :-

- -6.60×10^3 V/cm [Option ID = 30397]

95) The Boolean function Y= AB + CD is to be realized using only 2 input NAND gates .The minimum number of gates required is [Question ID = 15136]

1. 2 [Option ID = 30541]
2. 5 [Option ID = 30544]
3. 3 [Option ID = 30542]
4. 4 [Option ID = 30543]

Correct Answer :-

- 2 [Option ID = 30541]

96) For a base current of 10 μA in a common emitter amplifier (βdc = 100), the value of collector current is [Question ID = 15126]

1. 10 mA [Option ID = 30504]
2. 10 μA [Option ID = 30501]
3. 100 μA [Option ID = 30503]
4. 1 mA [Option ID = 30502]

Correct Answer :-

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97) A 1.0 KHz signal is flat top sampled at the rate of 1800 samples/sec and the samples are applied to an ideal rectangular LPF with cut-off frequency of 1100 Hz, then the output of the filter contains [Question ID = 15168]

1. 800 Hz and 900 Hz components [Option ID = 30671]
2. 800 Hz and 1000 Hz components [Option ID = 30669]
3. 800 Hz, 900 Hz and 100 Hz components [Option ID = 30672]
4. only 800 Hz component [Option ID = 30670]

Correct Answer :-

- 800 Hz and 1000 Hz components [Option ID = 30669]

98) A microprocessor differentiates between op code, data/address at any time by [Question ID = 15146]

1. The program counter [Option ID = 30583]
2. The stack pointer [Option ID = 30582]
3. The sequence in which memory contents are fetched by it [Option ID = 30581]
4. Its internal registers [Option ID = 30584]

Correct Answer :-

- The sequence in which memory contents are fetched by it [Option ID = 30581]

99) The correct sequence of the band gap of Germanium (E_{g1}), silicon (E_{g2}) and gallium arsenide (E_{g3}) will be

[Question ID = 15097]

1. $E_{g1} > E_{g2} < E_{g3}$ [Option ID = 30388]
2. $E_{g1} > E_{g2} > E_{g3}$ [Option ID = 30387]
3. $E_{g1} < E_{g2} < E_{g3}$ [Option ID = 30385]
4. $E_{g1} < E_{g2} > E_{g3}$ [Option ID = 30386]

Correct Answer :-

- $E_{g1} < E_{g2} < E_{g3}$ [Option ID = 30385]

100) In 8086 Microprocessor, if the content of the code segment register is 1FAB and the content of the IP register is 10A1, then the effective memory address is. [Question ID = 15141]

1. 1FBC0 [Option ID = 30561]
2. FDB5 [Option ID = 30563]
3. 30AC [Option ID = 30562]
4. 20B51 [Option ID = 30564]

Correct Answer :-

- 1FBC0 [Option ID = 30561]

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