DU MSc Electronics

Topic:- ELEC MSC

1) The value of $\int_{-1}^{1}\sqrt{\frac{1+t}{1-t}}dt =$

[Question ID = 2422]

1. $\frac{\pi}{2}$

   [Option ID = 9685]
2. $-\pi$

   [Option ID = 9686]
3. π

   [Option ID = 9687]
4. $-\frac{\pi}{2}$

   [Option ID = 9688]

2) For a scalar function $f(x, y, z) = 3x^2 + y^2 + 2z^2$ the gradient at the point $(2, -1, 1)$ is

[Question ID = 2423]

1. $12\hat{\imath} - 2\hat{\jmath} + 4\hat{k}$

   [Option ID = 9689]
2. $\hat{\imath} + 4\hat{k}$

   [Option ID = 9690]
3. $\hat{\imath} + \hat{\jmath} + \hat{k}$

   [Option ID = 9691]
4. $\hat{\imath} - 2\hat{\jmath}$

   [Option ID = 9692]

3) Let $A = \begin{bmatrix} 2 & -0.1 \\ 0 & 3 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1/2 & x \\ 0 & y \end{bmatrix}$ then $x + y =$

[Question ID = 2424]

1. 0.35

   [Option ID = 9693]
2. -0.35

   [Option ID = 9694]
3. 0.72

   [Option ID = 9695]
4. 1.00

   [Option ID = 9696]

4) Using Laplace transform evaluate $\int_0^\infty te^{-3t}sin2t\ dt =$

[Question ID = 2425]

1. 0.030

   [Option ID = 9697]
2. 1

   [Option ID = 9698]
3. 0.071

   [Option ID = 9699]
4. 0

   [Option ID = 9700]

5) The solution of the differential equation $\frac{dy}{dx} + y^2 = 0$ is

[Question ID = 2426]

1. $y = \frac{1}{x+c}$

   [Option ID = 9701]

2. $y = \frac{-x^3}{3} + c$

   [Option ID = 9702]

3. ce^x

   [Option ID = 9703]

4. $y = \frac{x^3}{3} + c$

   [Option ID = 9704]

6) The power internally generated within a LED, if it has internal quantum efficiency of 64.5 % and drive current of 40 mA with a peak emission wavelength of 0.82 μm, is

[Question ID = 2427]

1. 0.09

   [Option ID = 9705]

2. 0.04

   [Option ID = 9706]

3. 0.06

   [Option ID = 9707]

4. 0.039

   [Option ID = 9708]

7) The numerical aperture of a fibre if the angle of acceptance is 45 degrees, is

[Question ID = 2428]

1. 0.50

   [Option ID = 9709]

2. 0.17

   [Option ID = 9710]

3. 0.75

   [Option ID = 9711]

4. 0.707

   [Option ID = 9712]

8) What will be the output of the following C code?

```
#include <stdio.h>
int main()
{
int i = 7;
i = i / 2;
printf("%d\n", i);
return 0;
}
```

[Question ID = 2429]

1. 2

   [Option ID = 9713]

2. Error

   [Option ID = 9714]

3. 3

   [Option ID = 9715]

4. 1

   [Option ID = 9716]

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

```
#include <stdio.h>
int main()
```

```
{
printf("%d ", 1);
goto l1;
printf("%d ", 2);
l1:goto l2;
printf("%d ", 3);
l2:printf("%d ", 4);
}
```

[Question ID = 2430]

1. 1 4

   [Option ID = 9717]
2. Compilation error

   [Option ID = 9718]
3. 1 2 4

   [Option ID = 9719]
4. 1 3 4

   [Option ID = 9720]

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

```
#include<stdio.h>
int main()
{
int p = 10, q = 20, r;
if (r = p = 5 || q > 20)
printf("%d", r);
else
printf("No Output\n");
}
```

[Question ID = 2431]

1. 10

   [Option ID = 9721]
2. 20

   [Option ID = 9722]
3. 1

   [Option ID = 9723]
4. No Output

   [Option ID = 9724]

11) An electron in conduction band

[Question ID = 2432]

1. has no charge

   [Option ID = 9725]
2. is bound to its parent atom

   [Option ID = 9726]
3. has higher energy than an electron in the valance band

   [Option ID = 9727]
4. is located near the top of the crystal

   [Option ID = 9728]

12) In certain n-type semiconductor crystal at 300 K, if the electron concentration varies as $n(x) = 10^{16} exp\left(-\frac{x}{L}\right)_{cm^{-3}} ; x > 0$ and then the diffusion current at $x = 0$ is _____ (Here $L = 1\ \mu m$ and diffusion coefficient is 220 cm^2/s)

[Question ID = 2433]

1. 1.55 kA/cm^2

[Option ID = 9729]

2. 7.04 kA/cm^2

[Option ID = 9730]

3. 14.0 kA/cm^2

[Option ID = 9731]

4. 3.52 kA/cm^2

[Option ID = 9732]

13) If a BJT transistor has DC current gain

β= 49 and emitter injection efficiency is 0.995 then its base transport factor = _____

[Question ID = 2434]

1. 0.999

[Option ID = 9733]

2. 1

[Option ID = 9734]

3. 0.985

[Option ID = 9735]

4. 0.492

[Option ID = 9736]

14) The transconductance (g_m) of a JFET is equal to

[Question ID = 2435]

1. $-\frac{2I_{DSS}}{V_P}$

[Option ID = 9737]

2. $\frac{2}{V_P}\left(1-\frac{V_{GS}}{V_p}\right)$

[Option ID = 9738]

3. $-\frac{2I_{DSS}}{V_P}$

[Option ID = 9739]

4. $\frac{2}{|V_P|}\sqrt{I_{DSS}I_{DS}}$

[Option ID = 9740]

15) If certain direct band gap semiconductor has bandgap 1.98 eV then color of emitting light by that semiconductor is _____

[Question ID = 2436]

1. Blue

[Option ID = 9741]

2. Red

[Option ID = 9742]

3. Yellow

[Option ID = 9743]

4. Green

[Option ID = 9744]

16) A digital meter has a 3½-digit display and an accuracy of ± (0.6+1). The measurement accuracy for a 20 volt dc voltage will be

[Question ID = 2437]

1. ± 11.1 %

[Option ID = 9745]

2. ± 1.1 %

[Option ID = 9746]

3. ± 2.2%

[Option ID = 9747]

4. ± 22.2%

[Option ID = 9748]

17) A permanent magnet movement coil instrument with 500 μA FSD and a 1 kΩ coil resistance is to use in an Ammeter. The shunt resistance for a FSD of 100 mA is

[Question ID = 2438]

1. 10.02 W

   [Option ID = 9749]
2. 50.02 W

   [Option ID = 9750]
3. 1.025 W

   [Option ID = 9751]
4. 5.025 W

   [Option ID = 9752]

18) A basic Q-meter circuit has 100 mV ac supply, R= 10 Ω and $X_L=X_C$=100 Ω at resonance. The Q factor of the coil is

[Question ID = 2439]

1. 10

   [Option ID = 9753]
2. 50

   [Option ID = 9754]
3. 40

   [Option ID = 9755]
4. 20

   [Option ID = 9756]

19) An 820 Ω resistance with ±10% accuracy carries a 10 mA current. The current was measured on the 25 mA range analog meter that has ±2% accuracy of full scale. The % error in 10 mA current is

[Question ID = 2440]

1. ± 5 %

   [Option ID = 9757]
2. ± 10 %

   [Option ID = 9758]
3. ± 15 %

   [Option ID = 9759]
4. ± 20 %

   [Option ID = 9760]

20) A pulse waveform with a 10 ns rise time is applied to an oscilloscope that has an upper cutoff frequency of 10 MHz, the displayed rise time will be

[Question ID = 2441]

1. 36.4 ns

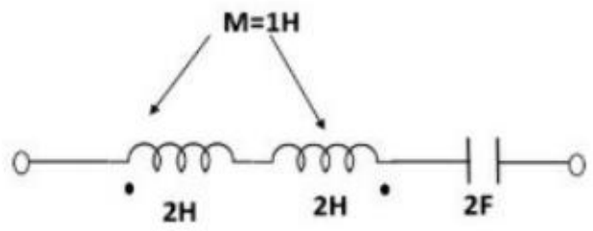
   [Option ID = 9761]
2. 25.7 ns

   [Option ID = 9762]
3. 51.5 ns

   [Option ID = 9763]
4. 47.6 ns

   [Option ID = 9764]

21) The resonant frequency of the series circuit shown in figure is:



[Question ID = 2442]

1. 1/6π

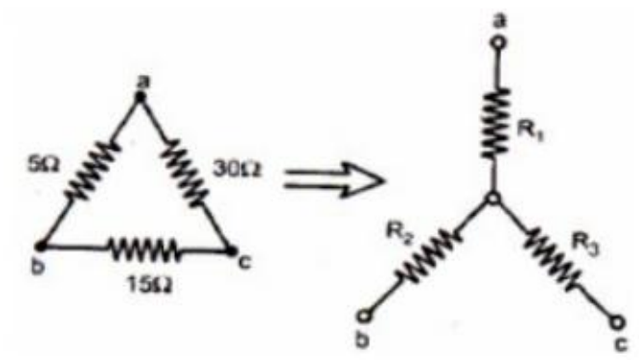
   [Option ID = 9765]
2. 1/4π

   [Option ID = 9766]
3. 1/π

   [Option ID = 9767]
4. 1/3π

   [Option ID = 9768]

22) A delta-connected network with its Star-equivalent is shown in figure. The resistances R_1, R_2, and R_3 (in ohms) are respectively.



[Question ID = 2443]

1. 9, 3 and 1.5

   [Option ID = 9769]
2. 3, 9 and 1.5

   [Option ID = 9770]
3. 1.5, 3 and 9

   [Option ID = 9771]
4. 3, 1.5 and 9

   [Option ID = 9772]

23) A series R-L-C circuit has a Q of 100 and an impedance of (100 + j0)Ω at its resonant angular frequency of 10^7 rad/sec. The values of R and L is:

[Question ID = 2444]

1. 10 Ω, 10^2 H

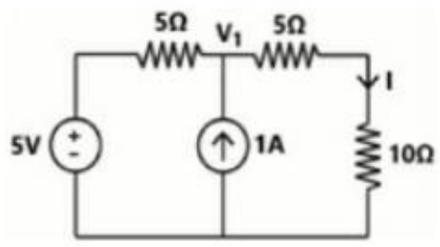
   [Option ID = 9773]
2. 1000 Ω, 10 H

   [Option ID = 9774]
3. 100 Ω, 100 H

   [Option ID = 9775]
4. 100 Ω, 10^{-3} H

   [Option ID = 9776]

24) In the figure shown, the value of the current I (in Amperes) is



[Question ID = 2445]

1. 0.5

   [Option ID = 9777]
2. 2

   [Option ID = 9778]
3. 0

   [Option ID = 9779]
4. 2.5

   [Option ID = 9780]

25) A current is flowing through a conductor with non-uniform area of cross-section. Then

[Question ID = 2446]

1. current will be different at different cross-sections

   [Option ID = 9781]
2. current will be the same but current density will be different at different cross-sections

   [Option ID = 9782]
3. current will be the same at all the cross-sections

   [Option ID = 9783]
4. current will be different but current density will be same at all the cross-sections

   [Option ID = 9784]

26) For an RC coupled common source junction field effect transitory (JFET) amplifier without bypass capacitor, g_m = 1 $m\Omega^{-1}$, source resistance is 2 kΩ, drain resistance is 15 kΩ and load is 10 kΩ. The value of voltage gain is

[Question ID = 2447]

1. -2.5

   [Option ID = 9785]
2. 5

   [Option ID = 9786]
3. -2

   [Option ID = 9787]
4. -5

   [Option ID = 9788]

27) A 35 mV signal is applied to the base of a properly biased transistor with r_e= 8 Ω and R_c = 1 kΩ. The output signal voltage at the collector is

[Question ID = 2448]

1. 3.25 V

   [Option ID = 9789]
2. 4.38 V

   [Option ID = 9790]
3. 28.62 V

   [Option ID = 9791]
4. 13.79 V

   [Option ID = 9792]

28) For step graded diode of area 5 cm^2, capacitance per unit area when no reverse bias is applied is 2 pF/cm^2. What is the net capacitance when applied reverse bias voltage is 99 V?

[Question ID = 2449]

1. 2 pF

   [Option ID = 9793]
2. 0.1 pF

   [Option ID = 9794]
3. 1 pF

   [Option ID = 9795]
4. 5 pF

   [Option ID = 9796]

29) If α = 0.995, I_E = 10 mA, I_{CO} = 0.5 μA, then I_{CEO} will be[Question ID = 2450]

1. 25 μA [Option ID = 9797]
2. 10.1 μA [Option ID = 9798]
3. 100 μA [Option ID = 9799]
4. 10.5 μA [Option ID = 9800]

30) In a Schmitt trigger, type of feedback is[Question ID = 2451]

1. degenerative feedback [Option ID = 9801]
2. regenerative feedback [Option ID = 9802]
3. either regenerative or degenerative [Option ID = 9803]
4. neither regenerative nor degenerative [Option ID = 9804]

31) Match List I with List II

List I	List II
A. $A \oplus B = 0$	I. A≠B
B. $\overline{A + B} = 0$	II. A=B
C. $\bar{A}B = 0$	III. A=1 or B=1
D. $A \oplus B = 1$	IV. A=1 or B=0

Choose the correct answer from the options given below:

[Question ID = 2452]

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

   [Option ID = 9805]
2. A - II, B - III, C - IV, D - I

   [Option ID = 9806]
3. A - III, B - II, C - IV, D - I

   [Option ID = 9807]
4. A - II, B - III, C - I, D - IV

   [Option ID = 9808]

32) Consider the following statements:

A. A NAND gate is equivalent to an OR gate with its inputs inverted.

B. A NOR gate is equivalent to an AND gate with its inputs inverted.

C. A NAND gate is equivalent to an OR gate with its output inverted.

D. A NOR gate is equivalent to an AND gate with its output inverted.

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

[Question ID = 2453]

1. A and B only

   [Option ID = 9809]
2. B and C only

   [Option ID = 9810]
3. C and D only

   [Option ID = 9811]
4. A and D only

   [Option ID = 9812]

33) If XY=0 then $X \oplus Y$ is equal to

[Question ID = 2454]

1. $\overline{X} + \overline{Y}$

   [Option ID = 9813]
2. XY

   [Option ID = 9814]
3. $\overline{XY}$

   [Option ID = 9815]
4. X+Y

   [Option ID = 9816]

34) In the following circuit the output Z is

[Question ID = 2455]

1. ABC

   [Option ID = 9817]
2. $A\overline{B}C$

   [Option ID = 9818]
3. $AB(\overline{C} + B)$

   [Option ID = 9819]
4. 0

   [Option ID = 9820]

35) The hexadecimal number 13AF to their decimal equivalent is:[Question ID = 2456]

1. 5039 [Option ID = 9821]
2. 5029 [Option ID = 9822]
3. 5019 [Option ID = 9823]
4. 5099 [Option ID = 9824]

36) The logic operation that will selectively clear bits in register A in those positions where there are 1's in the bits of register B is given by[Question ID = 2457]

1. $A \leftarrow A + B$

   [Option ID = 9825]
2. $A \leftarrow A\,\overline{B}$

   [Option ID = 9826]
3. $A \leftarrow \overline{A}\,B$

   [Option ID = 9827]
4. $A \leftarrow \overline{A} + \overline{B}$

   [Option ID = 9828]

37) Consider the following program intended to transfer a block of 5 bytes from A000H to 9000H

```
START:  LXI B, 9000H
        LXI H, A000H
        MVI C, 05H
LOOP:   MOV A, M
        STAX B
        INX B
        INX H
        DCR C
        JNZ LOOP
        HLT
```

The above program will not work because

[Question ID = 2458]

1. C register is used as counter

   [Option ID = 9829]
2. DCR C instruction will not affect zero flag

   [Option ID = 9830]
3. JNZ instruction is used instead of JZ

   [Option ID = 9831]
4. The first two instructions in loop should have been LDAX D and MOV M, A

   [Option ID = 9832]

38) Given below are two statements

Statement I : On executing the HLT instruction, the microprocessor enters into halt state and all the buses are tri-stated

Statement II : **On executing the HLT instruction, the microprocessor is disconnected from the system bus till the reset is pressed**

In light of the above statements, choose the *correct* answer from the options given below

[Question ID = 2459]

1. Both Statement (I) and Statement (II) are individually true but Statement (II) is not the correct explanation of Statement (I)

   [Option ID = 9833]
2. Both Statement (I) and Statement (II) are individually true and Statement (II) is the correct explanation of Statement (I)

   [Option ID = 9834]
3. Statement (I) is true but Statement (II) is false

   [Option ID = 9835]
4. Statement (I) is false but Statement (II) is true

   [Option ID = 9836]

39) Which one of the following interrupts is both level and edge sensitive?[Question ID = 2460]

1. RST 7.5 [Option ID = 9837]
2. TRAP [Option ID = 9838]
3. RST 5.5 [Option ID = 9839]
4. INTR [Option ID = 9840]

40) Consider the following statements regarding RESET instruction of 8085 microprocessor

A. PC content becomes 0000H

B. All interrupts are enabled

C. RESET OUT pin is at logic 0

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

[Question ID = 2461]

1. B only

   [Option ID = 9841]
2. A and B only

   [Option ID = 9842]
3. B and C only

   [Option ID = 9843]
4. A only

   [Option ID = 9844]

41) A particular material has 3×10^{24} atoms/m^3 and each atom has a dipole moment of $2.5\times10^{-25}\hat{u}_y$ Am^2. The magnetic field intensity $\widehat{H}$ in material with $\mu_r = 6$ is

[Question ID = 2462]

1. 0.22 $\hat{u}_y$ A/m

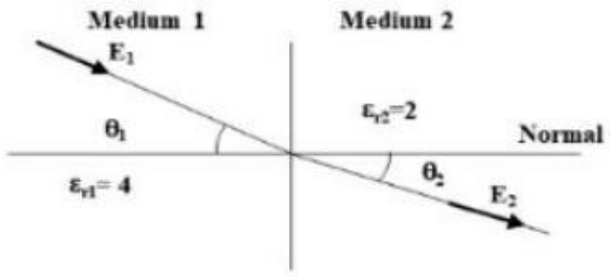
   [Option ID = 9845]
2. 0.75$\hat{u}_y$ A/m

   [Option ID = 9846]
3. 2.04$\hat{u}_y$ A/m

   [Option ID = 9847]
4. 0.15$\hat{u}_y$ A/m

   [Option ID = 9848]

42) In the following figure, the field E_1 makes an angle of q_1 with the axis normal to the boundary line, while the field E_2 makes an angle of q_2 in medium 2. The ratio of normal components of E_2 over E_1 (i.e. E_{n2}/E_{n1}) is



[Question ID = 2463]

1. 2 [Option ID = 9849]
2. 1/2 [Option ID = 9850]
3. 4 [Option ID = 9851]
4. 1/4 [Option ID = 9852]

43) If the flux density in a certain magnetic material is 0.25 T and the area of the material is 25 mm^2. The magnetic flux through material is

[Question ID = 2464]

1. 2.5 μWb

   [Option ID = 9853]
2. 0.5 μWb

   [Option ID = 9854]
3. 6.25 μWb

   [Option ID = 9855]
4. 25 μWb

   [Option ID = 9856]

44) A parallel-plate capacitor is formed with a mica dielectric $e_r = 6$, a plate area of 10 mm^2 and a separation of 0.01 mm^2. If the potential difference between the lower and upper plates is 100V, the total charge stored in capacitor $(\varepsilon_0 = 8.85 \times 10^{-12} F/m)$ is

[Question ID = 2465]

1. 12.00 μC

   [Option ID = 9857]
2. 5.31 μC

   [Option ID = 9858]
3. 62.46 μC

   [Option ID = 9859]
4. 10.78 μC

   [Option ID = 9860]

45) The gradient of the field $f = \rho^2 z \cos 2\phi$ at point $(2, 90°, 1)$ is

[Question ID = 2466]

1. $4(\hat{u}_\rho + \hat{u}_z)$

   [Option ID = 9861]
2. $-4(\hat{u}_\rho + \hat{u}_z)$

   [Option ID = 9862]
3. $4(\hat{u}_\rho - \hat{u}_\phi)$

   [Option ID = 9863]
4. $-4(\hat{u}_\rho - \hat{u}_\phi)$

[Option ID = 9864]

46) A 10MHz carrier is frequency modulated by a sinusoidal signal of 500 Hz, the maximum frequency deviation being 50 kHz. The bandwidth required, as given by Carson's rule is[Question ID = 2467]

1. 100 kHz [Option ID = 9865]
2. 99 kHz [Option ID = 9866]
3. 101 kHz [Option ID = 9867]
4. 98 kHz [Option ID = 9868]

47) In a PCM system with uniform quantization, increasing the number of bits from 8 to 9 will reduce the quantization noise power by a factor of

[Question ID = 2468]

1. 2

   [Option ID = 9869]
2. 9

   [Option ID = 9870]
3. 8

   [Option ID = 9871]
4. 4

   [Option ID = 9872]

48) A device with input $x(t)$ and output $y(t)$ is characterized by: $y(t) = x^2(t)$. An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to this device. The bandwidth of the output signal is

[Question ID = 2469]

1. 190 kHz

   [Option ID = 9873]
2. 370 kHz

   [Option ID = 9874]
3. 380 kHz

   [Option ID = 9875]
4. 95 kHz

   [Option ID = 9876]

49) An analog baseband signal, bandlimited to 100 Hz, is sampled at the Nyquist rate. The samples are quantized into four message symbols that occur independently with probabilities $p_1 = p_4 = 0.125$ and $p_2 = p_3$. The information rate (bits/sec) of the message source is

[Question ID = 2470]

1. 2.813 bits/sec

   [Option ID = 9877]
2. 1.11 bits/sec

   [Option ID = 9878]
3. 0.125 bits/sec

   [Option ID = 9879]
4. 1.811 bits/sec

   [Option ID = 9880]

50) A message signal given by $m(t) = \left(\frac{1}{2}\right)\cos\omega_1 t - \left(\frac{1}{2}\right)\sin\omega_1 t$ is amplitude-modulated with a carrier of frequency ω_c to generate $s(t) = [1 + m(t)]\cos\omega_c t$. What is the power efficiency achieved by this modulation scheme?

[Question ID = 2471]

1. 20%

   [Option ID = 9881]
2. 11.11%

   [Option ID = 9882]
3. 8.33%

   [Option ID = 9883]
4. 25%

   [Option ID = 9884]