

**GATE-2012**

**Question Paper**

**&**

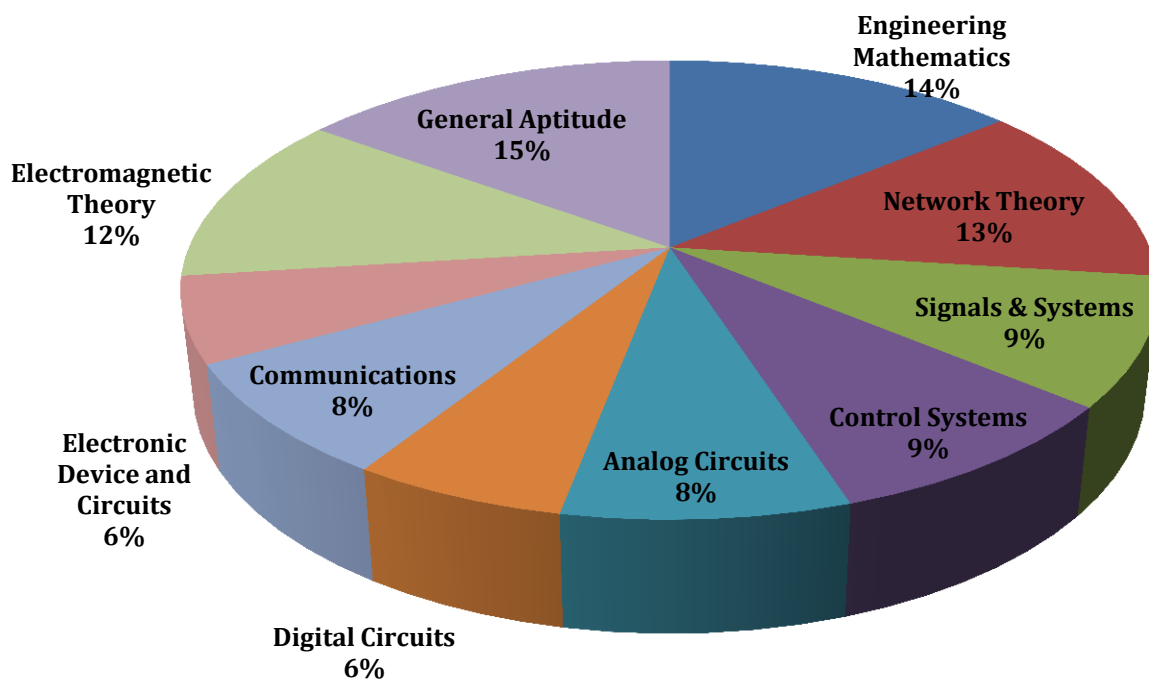
**Answer Keys**

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# ANALYSIS OF GATE 2012

## Electronics and Communication Engineering



**GATE-2012- ECE**

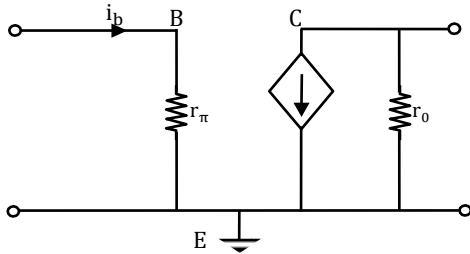
SUBJECT	NO OF QUESTION	Topics Asked in Paper	Total Marks
Engineering Mathematics	1M:4 2M:5	Probability & distribution Calculus, Differential Equations Complex Variables	14
Network Theory	1M:5 2M:4	Network Solution Methodology RLC Circuit - Transient/Steady State Analysis of RLC Circuits to dc Input, Two Port Net works	13
Signals & Systems	1M:3 2M:3	Fourier Representation of Signals Z-Transform Laplace-Transform Frequency response of LTI systems System analog	9
Control Systems	1M:1 2M:4	Stability & Routh Hurwitz Criterion Frequency Response Analysis Compensators & Controllers State Variable Analysis	9
Analog Circuits	1M:2 2M:3	Diode Circuits –Analysis And Application DC Biasing-BJT's Small Signal Modeling Of BJT and FET Operational Amplifiers And Its Applications	8
Digital Circuits	1M:4 2M:1	Boolean algebra & Karnaugh maps Logic Gates Combinational and Sequential digital Circuits	6
Communications	1M:2 2M:3	Angle modulation Digital communication	8
Electronic Device and Circuits	1M:0 2M:3	Transistor Theory (BJT, FET) Basics of Opto electronics	6
Electromagnetic Theory	1M:4 2M:4	Electromagnetic fields, EM Wave propagation Transmission Lines, Guided E.M Waves	12
General Aptitude	1M:5 2M:5	Numerical Ability Verbal Ability	15
<b>Total</b>	<b>65</b>		<b>100</b>

**GATE 2012 Examination**

**Electronics and Communication Engineering**

**Q.1 - Q.25 Carry One Mark each.**

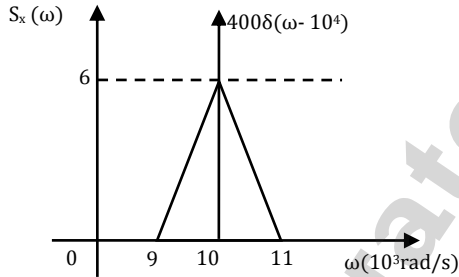
1. The current  $i_b$  through the base of a silicon npn transistor is  $1 + 0.1 \cos(10000 \pi t)$  mA. At 300 K, the  $r_\pi$  in the small signal model of the transistor is



- (A) 250  $\Omega$  (C) 25  $\Omega$   
(B) 27.5  $\Omega$  (D) 22.5  $\Omega$

**[Ans. C]**

2. The power spectral density of a real process  $X(t)$  for positive frequencies is shown below. The values of  $E[X^2(t)]$  and  $E[X(t)]$ , respectively, are



- (A)  $6000/\pi, 0$  (C)  $6400/\pi, 20/(\pi\sqrt{2})$   
(B)  $6400/\pi, 0$  (D)  $6000/\pi, 20/(\pi\sqrt{2})$

**[Ans. B]**

3. In a baseband communications link, frequencies upto 3500 Hz are used for signaling. Using a raised cosine pulse with 75% excess bandwidth and for no inter-symbol interference, the maximum possible signaling rate in symbols per second is

- (A) 1750 (C) 4000  
(B) 2625 (D) 5250

**[Ans. C]**

4. A plane wave propagating in air with  $\vec{E} = (8\hat{a}_x + 6\hat{a}_y + 5\hat{a}_z)e^{j(\omega t + 3x - 4y)}$  V/m is incident on perfectly conducting slab positioned at  $x \leq 0$ . The  $\vec{E}$  field of the reflected wave is

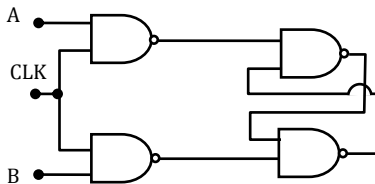
- (A)  $(-8\hat{a}_x - 6\hat{a}_y - 5\hat{a}_z)e^{j(\omega t + 3x + 4y)}$  V/m  
(B)  $(-8\hat{a}_x + 6\hat{a}_y - 5\hat{a}_z)e^{j(\omega t + 3x + 4y)}$  V/m  
(C)  $(-8\hat{a}_x - 6\hat{a}_y - 5\hat{a}_z)e^{j(\omega t - 3x - 4y)}$  V/m  
(D)  $(-8\hat{a}_x + 6\hat{a}_y - 5\hat{a}_z)e^{j(\omega t - 3x - 4y)}$  V/m

**[Ans. C]**

5. The electric field of a uniform plane electromagnetic wave in free space, along the positive x direction, is given by  $\vec{E} = 10(\hat{a}_y + j\hat{a}_z)e^{-j25x}$ . The frequency and polarization of the wave, respectively, are
- (A) 1.2 GHz and left circular (C) 1.2 GHz and right circular  
(B) 4 Hz and left circular (D) 4 Hz and right circular

[Ans. A]

6. Consider the given circuit



In this circuit, the race around

- (A) Does not occur  
(B) Occurs when CLK = 0  
(C) Occurs when CLK = 1 and A = B = 1  
(D) Occurs when clk = 1 and A = B = 0

[Ans. A]

7. The output Y of a 2-bit comparator is logic 1 whenever the 2-bit input A is greater than the 2-bit input B.

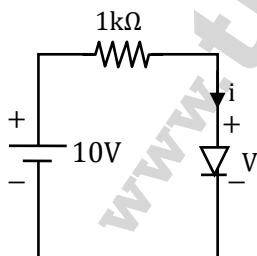
The number of combinations for which the output is logic 1, is

- (A) 4 (C) 8  
(B) 6 (D) 10

[Ans. B]

8. The I-V characteristics of the diode in the circuit given below are

$$i = \begin{cases} \frac{v - 0.7}{500} \text{ A,} & v \geq 0.7 \text{ V} \\ 0 \text{ A,} & v < 0.7 \text{ V} \end{cases}$$

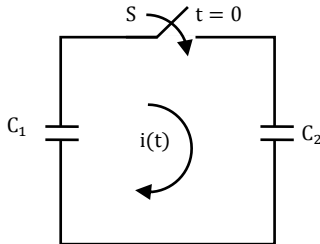


The current in the circuit is

- (A) 10 mA (C) 6.67 mA  
(B) 9.3 mA (D) 6.2 mA

[Ans. D]

9. In the following figure,  $C_1$  and  $C_2$  are ideal capacitors.  $C_1$  has been charged to 12 V before the ideal switch  $S$  is closed at  $t = 0$ . The current  $i(t)$  for all  $t$  is.



- (A) Zero  
(B) a step function  
(C) an exponentially decaying function  
(D) an impulse function  
**[Ans. D]**

10. The average power delivered to an impedance  $(4-j3)\Omega$  by a current  $5\cos(100\pi t+100)$  A is

- (A) 44.2 W  
(B) 50 W  
(C) 62.5 W  
(D) 125 W  
**[Ans. B]**

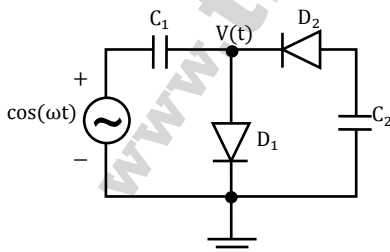
11. The unilateral Laplace transform of  $f(t)$  is  $\frac{1}{s^2+s+1}$ . The unilateral Laplace transform of  $t f(t)$  is

- (A)  $-\frac{s}{(s^2+s+1)^2}$   
(B)  $-\frac{2s+1}{(s^2+s+1)^2}$   
(C)  $\frac{s}{(s^2+s+1)^2}$   
(D)  $\frac{2s+1}{(s^2+s+1)^2}$   
**[Ans. D]**

12. With initial condition  $x(1) = 0.5$ , the solution of the differential equation,  $t \frac{dx}{dt} + x = t$  is

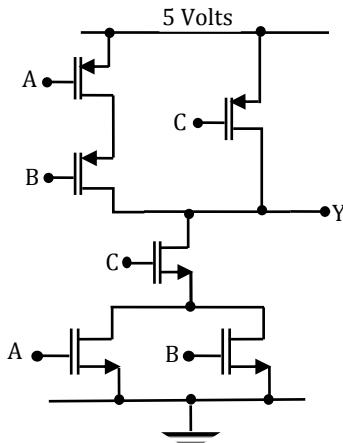
- (A)  $x = t - \frac{1}{2}$   
(B)  $x = t^2 - \frac{1}{2}$   
(C)  $xt = \frac{t^2}{2}$   
(D)  $x = \frac{t}{2}$   
**[Ans. C]**

13. The diodes and capacitors in the circuit shown are ideal. The voltage  $v(t)$  across the diode  $D_1$  is



- (A)  $\cos(\omega t) - 1$   
(B)  $\sin(\omega t)$   
(C)  $1 - \cos(\omega t)$   
(D)  $1 - \sin(\omega t)$   
**[Ans. A]**

14. In the circuit shown



- (A)  $Y = \bar{A}\bar{B} + \bar{C}$  (C)  $Y = (\bar{A} + \bar{B})\bar{C}$   
 (B)  $Y = (A + B)C$  (D)  $Y = AB + C$

**[Ans. A]**

15. A source alphabet consists of N symbols with the probability of the first two symbols being the same. A source encoder increases the probability of the first symbol by a small amount  $\epsilon$  and decreases that of the second by  $\epsilon$ . After encoding, the entropy of the source

- (A) Increases (C) Increases only if N = 2  
 (B) Remains the same (D) Decreases

**[Ans. D]**

16. A coaxial cable with an inner diameter of 1 mm and outer diameter of 2.4 mm is filled with a dielectric of relative permittivity 10.89.

Given

$\mu_0 = 4\pi \times 10^{-7}$  H/m,  $\epsilon_0 = \frac{10^{-9}}{36\pi}$  F/m, the characteristic impedance of the cable is

- (A) 330  $\Omega$  (C) 143.3  $\Omega$   
 (B) 100  $\Omega$  (D) 43.4  $\Omega$

**[Ans. \*] Not Matching for IIT Key**

17. The radiation pattern of an antenna in spherical co-ordinates is given by

$$F(\theta) = \cos^4\theta; 0 \leq \theta \leq \pi/2$$

The directivity of the antenna is

- (A) 10 dB (C) 11.5 dB  
 (B) 12.6 dB (D) 18 dB

**[Ans. A]**

18. If  $x[n] = (1/3)^{|n|} - (1/2)^n u[n]$ , then the region of convergence (ROC) of its Z-transform in the Z-plane will be

- (A)  $\frac{1}{3} < |Z| < 3$  (C)  $\frac{1}{2} < |Z| < 3$   
 (B)  $\frac{1}{3} < |Z| < \frac{1}{2}$  (D)  $\frac{1}{3} < |Z|$

**[Ans. C]**



19. In the sum of products function  $f(X, Y, Z) = \sum(2,3,4,5)$ , the prime implicants are  
 (A)  $\bar{X}Y, X\bar{Y}$  (C)  $\bar{X}Y\bar{Z}, \bar{X}YZ, X\bar{Y}$   
 (B)  $\bar{X}Y, \bar{X}\bar{Y}\bar{Z}, X\bar{Y}Z$  (D)  $\bar{X}Y\bar{Z}, \bar{X}YZ, X\bar{Y}\bar{Z}, X\bar{Y}Z$

[Ans. A]

20. A system with transfer function

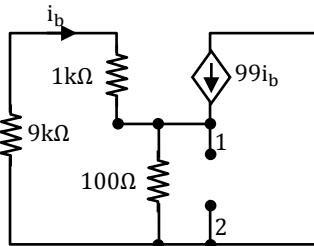
$$G(s) = \frac{(s^2 + 9)(s + 2)}{(s + 1)(s + 3)(s + 4)}$$

is excited by  $\sin(\omega t)$ . The steady-state output of the system is zero at

- (A)  $\omega = 1$  rad/s (C)  $\omega = 3$  rad/s  
 (B)  $\omega = 2$  rad/s (D)  $\omega = 4$  rad/s

[Ans. A]

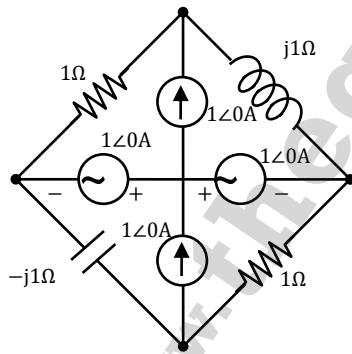
21. The impedance looking into nodes 1 and 2 in the given circuit is



- (A) 50 Ω (C) 5 kΩ  
 (B) 100 Ω (D) 10.1 kΩ

[Ans. A]

22. In the circuit shown below, the current through the inductor is



- (A)  $\frac{2}{1+j}$  A (B)  $\frac{1}{1+j}$  A  
 (C)  $\frac{-1}{1+j}$  A (D) 0 A

[Ans. -30]

23. Given  $f(z) = \frac{1}{z+1} - \frac{2}{z+3}$ . If  $C$  is a counterclockwise path in the  $z$ -plane such that  $|z+1|=1$ , the value of  $\frac{1}{2\pi j} \oint_C f(z) dz$  is

- (A) -2 (C) 1  
 (B) -1 (D) 2

[Ans. C]

24. Two independent random variables  $X$  and  $Y$  are uniformly distributed in the interval  $[-1, 1]$ . The probability that  $\max[X, Y]$  is less than  $1/2$  is  
 (A)  $3/4$  (C)  $1/4$   
 (B)  $9/16$  (D)  $2/3$   
**[Ans. B]**

25. If  $x = \sqrt{-1}$ , then the value of  $x^x$  is  
 (A)  $e^{-\pi/2}$  (C)  $x$   
 (B)  $e^{\pi/2}$  (D)  $1$   
**[Ans. A]**

**Q.26 - Q.55 Carry Two Mark each.**

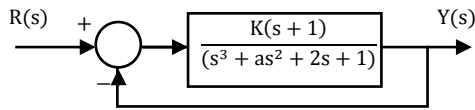
26. The source of a silicon ( $n_i = 10^{10}$  per  $\text{cm}^3$ ) n-channel MOS transistor has an area of  $1 \text{ sq}\mu\text{m}$  and a depth of  $1\mu\text{m}$ . If the dopant density in the source is  $10^{19}/\text{cm}^3$ , the number of holes in the source region with the above volume is approximately  
 (A)  $10^7$  (C)  $10$   
 (B)  $100$  (D)  $0$   
**[Ans. D]**

27. A BPSK scheme operating over an AWGN channel with noise power spectral density of  $N_0/2$ , uses equiprobable signals  $s_1(t) = \sqrt{\frac{2E}{T}} \sin(\omega_c t)$  and  
 $s_2(t) = -\sqrt{\frac{2E}{T}} \sin(\omega_c t)$   
 over the symbol interval,  $(0, T)$ . If the local oscillator in a coherent receiver is ahead in phase by  $45^\circ$  with respect to the received signal, the probability of error in the resulting system is  
 (A)  $Q\left(\sqrt{\frac{2E}{N_0}}\right)$  (C)  $Q\left(\sqrt{\frac{E}{2N_0}}\right)$   
 (B)  $Q\left(\sqrt{\frac{E}{N_0}}\right)$  (D)  $Q\left(\sqrt{\frac{E}{4N_0}}\right)$   
**[Ans. B]**

28. A transmission line with a characteristic impedance of  $100 \Omega$  is used to match a  $50 \Omega$  section to a  $200 \Omega$  section. If the matching is to be done both at  $429 \text{ MHz}$  and  $1 \text{ GHz}$ , the length of the transmission line can be approximately  
 (A)  $82.5 \text{ cm}$  (C)  $1.85 \text{ m}$   
 (B)  $1.58 \text{ m}$  (D)  $1.75 \text{ m}$   
**[Ans. B]**

29. The input  $x(t)$  and output  $y(t)$  of a system are related as  $y(t) = \int_{-\infty}^t x(\tau) \cos(3\tau) d\tau$ . The system is  
 (A) time-invariant and stable (C) time-invariant and not stable  
 (B) stable and not time-invariant (D) not time-invariant and not stable  
**[Ans. D]**

30. The Feedback system shown below oscillates at 2 rad/s when



- (A)  $K=2$  and  $a=0.75$  (C)  $K=4$  and  $a=0.5$   
(B)  $K=3$  and  $a=0.75$  (D)  $K=2$  and  $a=0.5$

**[Ans. A]**

31. The Fourier transform of a signal  $h(t)$  is  $H(j\omega) = (2 \cos \omega)(\sin 2 \omega)/\omega$ . The value of  $h(0)$  is

- (A)  $1/4$  (C)  $1$   
(B)  $1/2$  (D)  $2$

**[Ans. C]**

32. The state variable description of an LTI system is given by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \\ \dot{x}_3 \end{bmatrix} = \begin{bmatrix} 0 & a_1 & 0 \\ 0 & 0 & a_2 \\ a_3 & 0 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} u$$

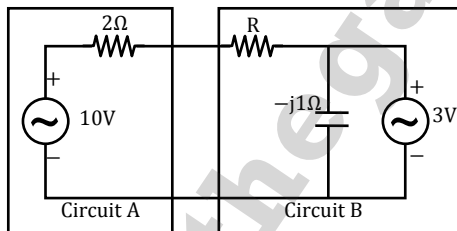
$$y = [1 \quad 0 \quad 0] \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix}$$

Where  $y$  is the output and  $u$  is the input. The system is controllable for

- (A)  $a_1 \neq 0, a_2 = 0, a_3 \neq 0$  (C)  $a_1 = 0, a_2 \neq 0, a_3 = 0$   
(B)  $a_1 = 0, a_2 \neq 0, a_3 \neq 0$  (D)  $a_1 \neq 0, a_2 \neq 0, a_3 = 0$

**[Ans. D]**

33. Assuming both the voltage sources are in phase the value of  $R$  for which maximum power is transferred from circuit A to circuit B is



- (A)  $0.8 \Omega$  (C)  $2 \Omega$   
(B)  $1.4 \Omega$  (D)  $2.8 \Omega$

**[Ans. A]**

34. Consider the differential equation

$$\frac{d^2 y(t)}{dt^2} + 2 \frac{dy(t)}{dt} + y(t) = \delta(t) \text{ with}$$

$$y(t)|_{t=0^-} = -2 \text{ and } \frac{dy}{dt}|_{t=0^-} = 0.$$

The numerical value of  $\frac{dy}{dt}|_{t=0^+}$  is

- (A)  $-2$  (C)  $0$   
(B)  $-1$  (D)  $1$

**[Ans. D]**

35. The direction of vector  $A$  is radially outward from the origin, with  $|A| = K r^n$  where  $r^2 = x^2 + y^2 + z^2$  and  $K$  is constant. The value of  $n$  for which

$\nabla \cdot A = 0$  is

- (A)  $-2$  (B)  $2$  (C)  $1$  (D)  $0$

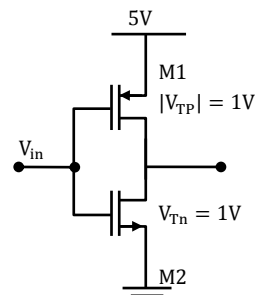
[Ans. A]

36. A fair coin is tossed till a head appears for the first time probability that the number of required tosses is odd, is

- (A)  $1/3$  (B)  $1/2$  (C)  $2/3$  (D)  $3/4$

[Ans. C]

37. In the CMOS circuit shown, electron and hole mobilities are equal, and M1 and M2 are equally sized. The device M1 is in the linear region if



- (A)  $V_{in} < 1.875 \text{ V}$  (C)  $V_{in} > 3.125 \text{ V}$   
(B)  $1.875 \text{ V} < V_{in} < 3.125 \text{ V}$  (D)  $0 < V_{in} < 5 \text{ V}$

[Ans. A]

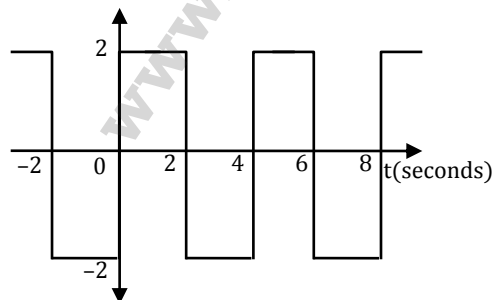
38. A binary symmetric channel (BSC) has a transition probability of  $1/8$ . If the binary transmit symbol  $X$  is such that

$P(X = 0) = 9/10$ , then the probability of error for an optimum receiver will be

- (A)  $7/80$  (C)  $9/10$   
(B)  $63/80$  (D)  $1/10$

[Ans. D]

39. The signal  $m(t)$  as shown is applied both to a phase modulator (with  $k_p$  as the phase constant) and a frequency modulator (with  $k_f$  as the frequency constant) having the same carrier frequency.



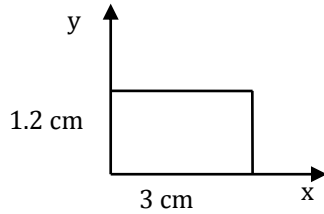
The ratio  $k_p/k_f$  (in rad/Hz) for the same maximum phase deviation is

- (A)  $8\pi$  (C)  $2\pi$   
(B)  $4\pi$  (D)  $\pi$

[Ans. B]

40. The magnetic field along the propagation direction inside a rectangular waveguide with the cross-section shown in the figure is

$$H_z = 3 \cos(2.094 \times 10^2 x) \cos(2.618 \times 10^2 y) \cos(6.283 \times 10^{10} t - \beta z)$$

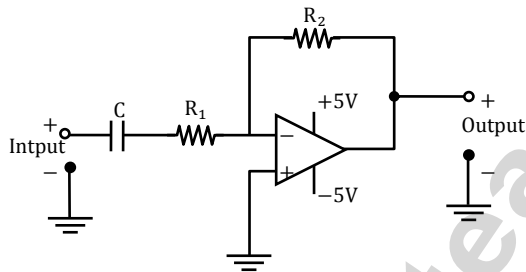


The phase velocity  $v_p$  of the wave inside the waveguide satisfies

- (A)  $v_p > c$  (C)  $0 < v_p < c$   
(B)  $v_p = c$  (D)  $v_p = 0$

[Ans. D]

41. The circuit shown is a



- (A) Low pass filter with  $f_{3dB} = \frac{1}{(R_1 + R_2)C}$  rad/s  
(B) High pass filter with  $f_{3dB} = \frac{1}{R_1 C}$  rad/s  
(C) Low pass filter with  $f_{3dB} = \frac{1}{R_1 C}$  rad/s  
(D) High pass filter with  $f_{3dB} = \frac{1}{(R_1 + R_2)C}$  rad/s

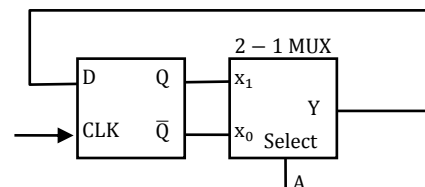
[Ans. B]

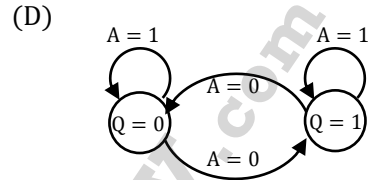
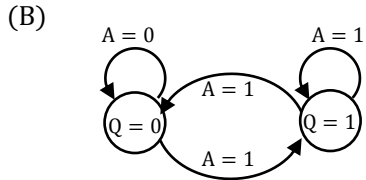
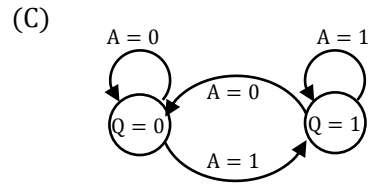
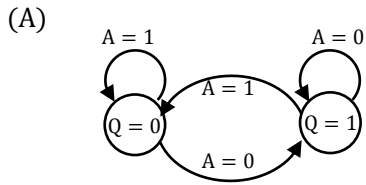
42. Let  $y[n]$  denote the convolution of  $h[n]$  and  $g[n]$ , where  $h[n] = (1/2)^n u[n]$  and  $g[n]$  is causal sequence. If  $y[0] = 1$  and  $y[1] = 1/2$ , then  $g[1]$  equals

- (A) 0 (C) 1  
(B) 1/2 (D) 3/2

[Ans. A]

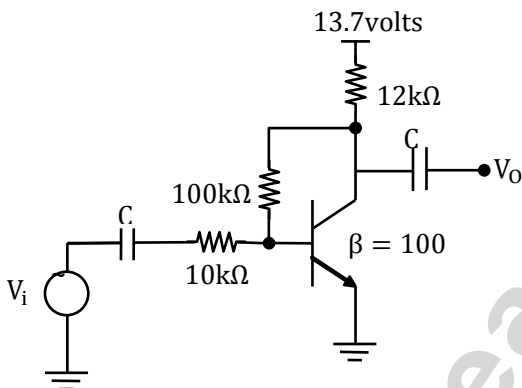
43. The state transition diagram for the logic circuit shown is





[Ans. D]

44. The voltage gain  $A_V$  of the circuit shown below is

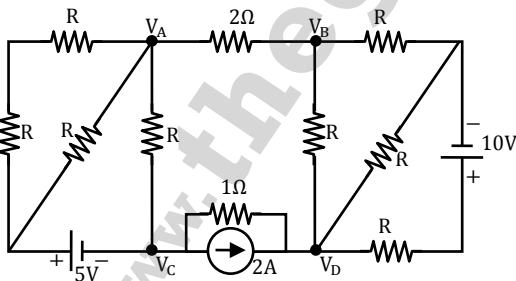


- (A)  $|A_V| \approx 200$   
(B)  $|A_V| \approx 100$

- (C)  $|A_V| \approx 20$   
(D)  $|A_V| \approx 10$

[Ans. D]

45. If  $V_A - V_B = 6\text{ V}$ , then  $V_C - V_D$  is



- (A)  $-5\text{ V}$   
(B)  $2\text{ V}$

- (C)  $3\text{ V}$   
(D)  $6\text{ V}$

[Ans. A]

46. The maximum value of  $f(x) = x^3 - 9x^2 + 24x + 5$  in the interval  $[1,6]$  is

- (A) 21  
(B) 25

- (C) 41  
(D) 46

[Ans. C]

47. Given that  $A = \begin{bmatrix} -5 & -3 \\ 2 & 0 \end{bmatrix}$  and  $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ , the value of  $A^3$  is  
 (A)  $15A + 12I$  (C)  $17A + 15I$   
 (B)  $19A + 30I$  (D)  $17A + 21I$   
**[Ans. B]**

**Common Data for Questions 48 and 49**

With 10 V dc connected at port A in the linear nonreciprocal two-port network shown below, the following were observed:

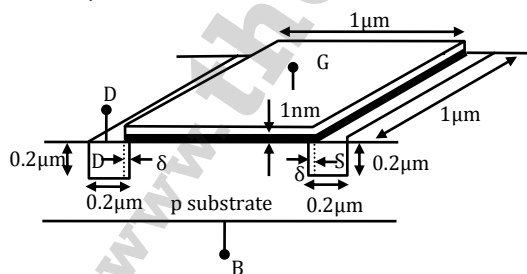
- (i)  $1\Omega$  connected at port B draws a current of 3 A  
 (ii)  $2.5\Omega$  connected at port B draws a current of 2 A



48. With 10 V dc connected at port A, the current drawn by  $7\Omega$  connected at port B is  
 (A)  $3/7$  A (C) 1 A  
 (B)  $5/7$  A (D)  $9/7$  A  
**[Ans. C]**
49. For the same network, with 6 V dc connected at port A,  $1\Omega$  connected at port B draws  $7/3$  A. If 8 V dc is connected to port A, the open circuit voltage at port B is  
 (A) 6 V (C) 8 V  
 (B) 7 V (D) 9 V  
**[Ans. B]**

**Common Data for Questions 50 and 51**

In the three dimensional view of a silicon n-channel MOS transistor shown below,  $\delta = 20$  nm. The transistor is of width  $1\mu\text{m}$ . The depletion width formed at every p-n junction, is  $10\text{nm}$ . The relative permittivities of Si and  $\text{SiO}_2$ , respectively, are 11.7 and 3.9, and  $\epsilon_0 = 8.9 \times 10^{-12}\text{F/m}$ .



50. The gate-source overlap capacitance is approximately  
 (A) 0.7 fF (C) 0.35 fF  
 (B) 0.7 pF (D) 0.24 pF  
**[Ans. A]**
51. The source-body junction capacitance is approximately  
 (A) 2 fF (C) 2 pF  
 (B) 7 fF (D) 7 pF  
**[Ans. A]**

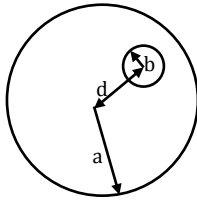
**Statement for Linked Answer Questions 52 and 53**

An infinitely long uniform solid wire of radius  $a$  carries a uniform dc current of density  $\vec{j}$ .

52. The magnetic field at a distance  $r$  from the center of the wire is proportional to  
 (A)  $r$  for  $r < a$  and  $1/r^2$  for  $r > a$  (C)  $r$  for  $r < a$  and  $1/r$  for  $r > a$   
 (B)  $0$  for  $r < a$  and  $1/r$  for  $r > a$  (D)  $0$  for  $r < a$  and  $1/r^2$  for  $r > a$

[Ans. C]

53. A hole of radius  $b$  ( $b < a$ ) is now drilled along the length of the wire at a distance  $d$  from the center of the wire as shown below.



The magnetic field inside the hole is

- (A) uniform and depends only on  $d$  (C) uniform and depends on both  $b$  and  $d$   
 (B) uniform and depends only on  $b$  (D) non uniform

[Ans. C]

**Statement for Linked Answer Questions 54 and 55**

The transfer function of a compensator is given as

$$G_c(s) = \frac{s + a}{s + b}$$

54.  $G_c(s)$  is a lead compensator if  
 (A)  $A = 1, b = 2$  (C)  $A = -3, b = -1$   
 (B)  $A = 3, b = 2$  (D)  $A = 3, b = 1$

[Ans. A]

55. The phase of the above lead compensator is maximum at  
 (A)  $\sqrt{2}$  rad/s (C)  $\sqrt{6}$  rad/s  
 (B)  $\sqrt{3}$  rad/s (D)  $1/\sqrt{3}$  rad/s

[Ans. A]

**General Aptitude One Marks Question Q. 56 to Q. 60**

56. One of the parts (A, B, C, D) in the sentence given below contains an ERROR. Which one of the following is INCORRECT?

I requested that he should be given the driving test today instead of tomorrow

- (A) Requested that (C) The driving test  
 (B) Should be given (D) Instead of-tomorrow

[Ans. B]

57. If  $(1.001)^{1259} = 3.52$  and  $(1.001)^{2062} = 7.85$ , then  $(1.001)^{3321} =$   
 (E) 2.23 (G) 11.37  
 (F) 4.33 (H) 27.64

[Ans. D]



58. Choose the most appropriate alternative from the options given below to complete the following sentence:

If the tired soldier wanted to lie down, he \_\_\_\_\_ the mattress out on the balcony.

- (A) Should take (C) Should have taken  
(B) Shall take (D) Will have taken

**[Ans. A]**

59. Choose the most appropriate word from the options given below to complete the following sentence:

Given the seriousness of the situation that he had to face, his \_\_\_\_\_ was impressive.

- (A) beggary (C) jealousy  
(B) nomenclature (D) nonchalance

**[Ans. D]**

60. Which one of the following options is the closest in meaning to the word given below?

Latitude

- (A) Eligibility (C) Coercion  
(B) Freedom (D) Meticulousness

**[Ans. B]**

**General Aptitude Two Marks Question Q. 61 to Q. 65**

61. A and B are friends. They decide to meet between 1 PM and 2 PM on a given day. There is a condition that whoever arrives first will not wait for the other for more than 15 minutes. The probability that they will meet on that day is

- (A)  $1/4$  (C)  $7/16$   
(B)  $1/16$  (D)  $9/16$

**[Ans. A]**

62. One of the legacies of the Roman legions was discipline. In the legions, military law prevailed and discipline was brutal. Discipline on the battlefield kept units obedient, intact and fighting even when the odds and conditions were against them.

Which one of the following statements best sums up the meaning of the above passage?

- (A) Thorough regimentation was the main reason for the efficiency of the Roman legions even in adverse circumstances  
(B) The legions were treated inhumanly as if the men were animals  
(C) Discipline was the armies' inheritance from their seniors  
(D) The harsh discipline to which the legions were subjected to led to the odds and conditions being.....against them

**[Ans. A]**

63. Raju has 14 currency notes in his pocket consisting of only  $\square$  20 notes and  $\square$  10 notes. The total money value of the notes is  $\square$  230. The number of  $\square$  10 notes that Raju has is

- (A) 5 (C) 9  
(B) 6 (D) 10

**[Ans. A]**

64. There are eight bags of rice looking alike, seven of which have equal weight and one is slightly heavier. The weighing balance is of unlimited capacity. Using this balance, the minimum number of weighing's required to identify the heavier bag is
- (A) 2 (C) 4  
(B) 3 (D) 8
- [Ans. A]**

65. The data given in the following table summarizes the monthly budget of an average household.

Category	Amount (₹)
Food	4000
Clothing	1200
Rent	2000
Savings	1500
Other expenses	1800

The approximate percentage of the monthly budget NOT spent on savings is

- (A) 10% (C) 81%  
(B) 14% (D) 86%
- [Ans. D]**