



## ISRO Previous Year Papers Electronics & Telecommunications

**GATEFORUM** Pioneers in Digital courses for GATE since 2008 has long history of training students through innovative courses. Currently GATEFORUM offers a wide range of courses from eGATE, GATE Online, Gdrive to Online TarGATE. Since inception, we have trained more 3,00,000 students since inception.

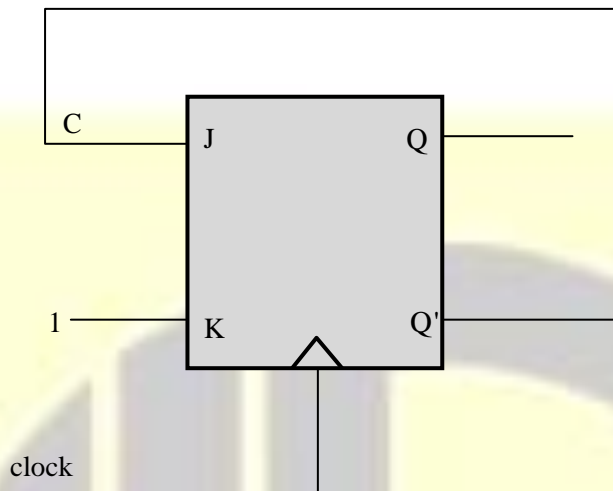
**For more details visit [gateforumonline.com](http://gateforumonline.com)**

1. In an amplitude modulated system if the total power is 600W and the power in the carrier is 400W, the modulation index is  
(A) -0.5                      (B) 0.75                      (C) 0.9                      (D) 1
- 
2. The channel capacity under the Gaussian noise environment for a discrete memoryless with a bandwidth of 4 MHz and SNR of 31 is.  
(A) 20 Mbps                      (B) 4 Mbps                      (C) 8 kbps                      (D) 4 kbps
- 
3. In satellite communication, frequency modulation is used because satellite channel has  
(A) High modulation index  
(B) Small bandwidth and negligible noise  
(C) Large bandwidth and severe noise  
(D) Maximum bandwidth and minimum noise
- 
4. For a 3-um-diameter optical fiber with core and cladding indexes of refraction of 1.545 and 1.510, respectively. The cut off wavelength is.  
(A) 2.3 um                      (B) 1.29 um                      (C) 1.5 um                      (D) 3.24 um
- 
5. A 12-bit ADC is operating with a 1μs clock period and total conversion time is seen to be 14μs always. The ADC must be of the type  
(A) Flash type                      (B) Counting type  
(C) Integrating type                      (D) Successive approximation type
- 
6. Consider the analog signal  $x(t) = 3\cos 100\pi t$ . If the signal sampled at 200Hz, the discrete time signal obtained will be  
(A)  $3\cos(\pi n/4)$                       (B)  $3\cos(\pi n/2)$                       (C)  $3\cos(\pi n)$                       (D)  $3\cos(\pi n/3)$
-

7. In VHDL all the statements written inside a process statement are \_\_\_\_\_  
(A) Concurrent (B) Sequential  
(C) Both (A) and (B) (D) None of the above
- 
8. A microprocessor with 12-bit address bus will be able to access \_\_\_\_\_ kilobytes of memory  
(A) 0.4 (B) 2 (C) 10 (D) 4
- 
9. A practical current source is usually represented by  
(A) A resistance in series with an ideal current source  
(B) A resistance in parallel with an ideal current source  
(C) A resistance in parallel with an ideal voltage source  
(D) None of the above
- 
10. The dominant mode in a rectangular wave guide is TE<sub>0</sub>, because this mode has  
(A) No attenuation (B) No cut off  
(C) No magnetic field component (D) The highest cut-off wavelength
- 
11. A PN junction in series with a 100 ohm resistor is forward biased so that a current of 100 mA flows. If voltage across the combination is instantaneously reversed to 10V at time  $t = 0$ , the reverse current that flows through the junction at  $t = 0$  approximately given by  
(A) 0 mA (B) 200 mA (C) 50 mA (D) 100 mA
- 
12. Ripple factor for a half wave rectifier is \_\_\_\_\_  
(A) 1.65 (B) 1.45 (C) 1 (D) 1.21
-

13. \_\_\_\_\_ is a primitive that can execute code. It contains an instruction pointer (= program counter) and sometimes has its own stack  
(A) Process (B) Task (C) Kernel (D) Thread
- 
14. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - px + q = 0$ , then  $\Sigma\alpha^2$  is  
(A)  $p^2 + 2q$  (B)  $p + 2q$  (C)  $p^2 - 2q$  (D)  $p - 2q$
- 
15. A signal  $m_1(t)$  is band limited to 3.6 kHz and the three other signals  $m_2(t)$ ,  $m_3(t)$  and  $m_4(t)$  are band limited to 1.2 kHz each, and these signals are transmitted by means of TDM. Then, what will be the transmission bandwidth of the channel.  
(A) 7.2 KHz (B) 14.4 KHz (C) 3.6 KHz (D) 2.4 KHz
- 
16. For a 10 bit PCM system the signal to quantization noise ratio is 62 dB. If the number of bits is increased by 2, then signal to quantization noise ratio will  
(A) Increase by 6 dB (B) Increase by 12 dB  
(C) Decrease by 6 dB (D) Decrease by 12 dB
- 
17. The modulation normally used with the digital data is  
(A) FM (B) AM (C) SSB (D) QPSK
- 
18. The critical angle  $\theta_c$  in an optical fiber is given by \_\_\_\_\_. Where  $n_1$  is refractive index of medium 1 and  $n_2$  is the refractive index of medium 2.  
(A)  $\sin^{-1}(n_2/n_1)$  (B)  $\sin^{-1}(n_1/n_2)$   
(C)  $\sin^{-1}(n_2 * n_1)$  (D)  $\sin^{-1}n_2$
-

19. In a JK flip flop we have  $J = Q'$  and  $K = 1$ . Assuming that the flip flop was initially cleared and clocked for 6 pulses, the sequence of the Q output will be



- (A) 010000      (B) 011001      (C) 010010      (D) 010101

20. Which of the following system is linear

- (A)  $y(n) = e^{x(n)}$       (B)  $y(n) = Ax(n) + B$   
 (C)  $y(n) = x(n^2)$       (D)  $y(n) = x^2(n)$

21. Which of the following operator cannot be synthesized by VHDL synthesis tools ?

- (A) +      (B) -      (C) \*      (D) &

22. Which of the following statement with reference to a generic microprocessor is correct?

- (A) Instruction cycle time period is exactly equal to machine cycle time period  
 (B) Instruction cycle time period is shorter than machine cycle time period  
 (C) Machine cycle time period is shorter than instruction cycle time period  
 (D) Instruction cycle time period is exactly half of machine cycle time period

23. An electric iron designated for 110V AC supply was rated at 500W. It was put across a 220V supply. Assuming that at 110V it supplied 500W output (i.e., no losses) at the new voltage it will supply  
(A) 2500W                      (B) 250W                      (C) 500W                      (D) 2000W
- 
24. A very lossy,  $\lambda/4$  long, 50 ohm transmission line is open circuited at the load end. The input impedance measured at the other end of the line is approximately.  
(A) 0                      (B)  $\infty$                       (C) 50 ohm                      (D) none of the above
- 
25. For the 2N338 transistor, the manufacturer specifies  $P_{max} = 100\text{mW}$  at  $25^\circ\text{C}$  free air temperature and the maximum junction temperatures,  $T_{j\text{max}} = 125^\circ$ . Its thermal resistance is  
(A)  $10^\circ\text{C/W}$                       (B)  $100^\circ\text{C/W}$                       (C)  $1000^\circ\text{C/W}$                       (D)  $10,000^\circ\text{C/W}$
- 
26. In a Class AB amplifier, the current flows through the active device for  
(A) Less than half of the duration of input cycle  
(B) Half duration of input cycle  
(C) More than half but less than full cycle duration  
(D) Full duration of input cycle
- 
27. Which of the following is not true regarding a preemptive kernel  
(A) If a high priority thread becomes ready to run, low priority thread is preempted  
(B) The kernel checks for the high priority ready to run threads when ever called  
(C) The executing thread is never interrupted  
(D) There are special demand on communication between thread and handling common resources
-

28. The solution of differential equation  $\frac{dy}{dx} = e^{x-y} + x^2e^{-y}$  is
- (A)  $e^y = e^x + \frac{x^3}{3+c}$  (B)  $e^y - e^x = c$
- (C)  $x - e^y = c$  (D)  $e^y + e^x + \frac{x^3}{3+y} = 0$
- 
29. The intermediate frequency of a super-heterodyne receiver is 450 KHz. If it is tuned to 1200 KHz, the image frequency will be
- (A) 750 KHz (B) 900 KHz (C) 1600 KHz (D) 2100 KHz
- 
30. The bandwidth of a 'N' bit binary coded PCM signal for modulating a signal having bandwidth of 'f' Hz is
- (A) f/N (B) f (C) Nf (D) N
- 
31. Geo-stationary satellites are placed in equatorial orbits at the height approximately
- (A) 1000 km (B) 15000 km (C) 25000 km (D) 36000 km
- 
32. For a single mode optical cable with 0.25 dB/km loss, the optical power 100km from a 0.1mW source will be\_\_\_\_\_.
- (A) -30 dBm (B) -35 dBm (C) -40 dBm (D) -45 dBm
- 
33. The function of a strobe function in digital system is
- (A) To reset memory register
- (B) To check the functioning of a logic gate
- (C) To avoid race problem
- (D) To tri-state the output of the register
-

34. The impulse response of a linear time invariant system is  $h(n) = \{1, 2, 1, -1\}$ . The response for the input signal  $x(n) = \{1, 2, 3, 1\}$  is
- (A)  $\{1, 8, 4, 8, 3, -1, -2\}$  (B)  $\{1, 4, 8, 3, 8, -2, -2\}$   
(C)  $\{1, 4, 8, 8, 3, -2, -1\}$  (D)  $\{1, 8, 3, 8, 8, 4, -1\}$
- 
35. Which of the following statement regarding a constant is not true
- (A) Constant defined in a package can be referenced by any entity or architecture for which package is used  
(B) The value of constant can be changed with in the design description  
(C) Constant defined in an architecture is visible only to that architecture  
(D) Constant defined in a process declarative region is not visible outside that process
- 
36. In a 8085 microprocessor system with memory mapped I/O
- (A) I/O devices have 8 bit address  
(B) I/O devices are accessed using IN and OUT instructions  
(C) There can be maximum 256 input and 256 output devices  
(D) Arithmetic and logic operations can be directly performed with I/O data
- 
37. The Thevenin and Norton circuits are
- (A) Single frequency equivalent circuits (B) Multi frequency equivalent circuits  
(C) Equivalent independent of frequency (D) Band frequency equivalent circuits
- 
38. A broadside array operating at 100 cm wavelength consist of 4 half wave dipoles spaced 50 cm apart, Each element carries radio frequency current in the same phase and of magnitude 0.5A. The radiated power will be \_\_\_\_\_ if the radiation resistance is 1.46 ohm.
- (A) 146 W (B) 73 W (C) 36.5 W (D) 18.25 W
-



39. An NPN transistor has a beta cut off frequency  $f_{\beta}$  of 1MHz, and a common emitter short circuit low frequency current gain  $\beta_o$  of 200. Its unity gain frequency  $f_T$  and the alpha cut-off frequency  $f_{\alpha}$  respectively are
- (A) 200 MHz, 201 MHz  
(B) 200 MHz, 199 MHz  
(C) 199 MHz, 200 MHz  
(D) 201 MHz, 200 MHz
- 
40. For an earth station transmitter input power of 40 dBW (10, 000W), with a back off loss of 3dB, a total branching and feeder loss of 3dB, and a transmit antenna gain of 40dB, determine the EIRP.
- (A) 40 dBW                      (B) 74 dBW                      (C) 34 dBW                      (D) 80 dBW
- 
46. \_\_\_\_\_ is used to describe the light gathering or light collecting ability of an optical fiber
- (A) Critical angle  
(B) Cut-off wavelength  
(C) Numerical Aperture  
(D) Acceptance angle
- 
47. \_\_\_\_\_ has the maximum fan out capacity
- (A) MOS                      (B) CMOS                      (C) ECL                      (D) RTL
- 
48. If Z transform of  $x(n)$  is  $X(z)$  then the Z transform of  $x(n-k)$  is \_\_\_\_\_
- (A)  $X(z^{-k}z)$                       (B)  $X(z^kz)$                       (C)  $z^{-k}X(z)$                       (D)  $z^kX(z)$
-

49. The following code will implement a \_\_\_\_\_

```
process (clk, d) begin
    if (clk = '1') then
        q <= d;
    end if;
end process
```

- (A) Positive edge triggered D flip flop                      (B) Negative edge triggered D flip flop  
(C) A latch                                                              (D) None of the above

50. The greatest negative number which can be stored in a 8-bit register using 2's complement arithmetic is

- (A) -256                      (B) -255                      (C) -127                      (D) -128

51. Two coupled coils have self inductance  $L_1 = 10$  mH and  $L_2 = 20$  mH. The coefficient of coupling (K) being 0.75 in the air. Voltage in the second coil when the current in circuit is given by  $I = 2 \sin(314t)$  A is \_\_\_\_\_.

- (A)  $3.14 \cos(314t)$  V                                              (B)  $3.33 \sin(314t)$  V  
(C)  $6.66 \cos(314t)$  V                                              (D)  $6.28 \cos(314t)$  V

52. In a radar system, if the peak transmitted power is increased by a factor of 16 and the antenna diameter is increased by a factor of 2, then the maximum range will increase by a factor of

- (A) 16                      (B) 8                      (C) 4                      (D)  $\sqrt{8}$

53. The transconductance  $g_m$  of an FET in the saturation region equals

- (A)  $\frac{-2I_{DSS}}{V_P} \left[ 1 - \frac{V_{GS}}{V_P} \right]$                                               (B)  $\frac{-2I_{DSS}}{V_P} \left[ 1 - \frac{V_{GS}}{V_P} \right]^2$   
(C)  $\frac{-2I_{DSS}}{V_P} \left[ 1 - \frac{V_{GS}}{V_P} \right]^{1/2}$                                               (D)  $\frac{1}{V_P} [I_{DSS} X I_{DS}]^{1/2}$

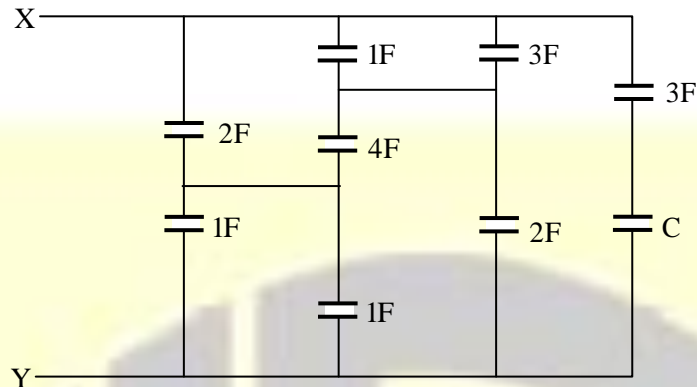
54. The transistor amplifier with 85% of efficiency is likely to be  
(A) Class A                      (B) Class B                      (C) Class AB                      (D) Class C
- 
55. A run-time stack cannot be used in a round-robin scheduling system because of the \_\_\_\_\_ nature of scheduling  
(A) LIFO (Last in First out)                      (B) FIFO (First in First out)  
(C) FILO (First in Last out)                      (D) None of the above
- 
56.  $(3 + i)/(5 + 5i)$  is same as  
(A)  $(2-i)/5$                       (B)  $3-i$                       (C)  $5-5i$                       (D)  $(2+i)/5$
- 
57. The modulation index of an amplitude modulated wave is changed from 0 to 1, the transmitted power is  
(A) Doubled                      (B) Halved  
(C) Increased by 50 percent                      (D) Unchanged
- 
58. In a communication system, each message (1 or 0) is transmitted three times in order to reduce the probability of error. The detection is based on the majority rule at the receiver. If  $P_c$  is the probability of bit error, the probability of error for this communication channel will be  
(A)  $3P_c^2 - 2P_c^3$                       (B)  $1 - P_c^2 - P_c^3$                       (C)  $P_c^3$                       (D)  $P_c^2(1 - P_c)$
- 
59. For a satellite transponder with a receiver antenna gain of 12 dB, an LNA gain of 10 dB, and equivalent noise temperature of  $26 \text{ dBK}^{-1}$ , the  $G/T_e$  is  
(A)  $4 \text{ dBK}^{-1}$                       (B)  $-4 \text{ dBK}^{-1}$                       (C)  $26 \text{ dBK}^{-1}$                       (D)  $-26 \text{ dBK}^{-1}$
-

60. \_\_\_\_\_ current is the leakage current that flows through a photo diode with no input used in as light detectors.
- (A) Leakage (B) Dark  
(C) saturation current (D) Detection
- 
61. The figure of merit of a logic family is given by
- (A) Gain bandwidth product  
(B) (propagation delay time) \* (power dissipation)  
(C) fanout \* (propagation delay time)  
(D) (noise margin) \* (power dissipation)
- 
62. \_\_\_\_\_ is defined as the time delay that a signal component of frequency  $\omega$  undergoes as it passes from the input to output of the system.
- (A) Phase delay (B) Group delay  
(C) Frequency deviation (D) Latency
- 
63. Which statement is true regarding a behavior modeling in VHDL
- (A) There can be more than one process statement in an architecture which will interact concurrently  
(B) Behavioral style of architecture can have only concurrent assignment statements  
(C) Process is not a single concurrent statement  
(D) A process need not have sensitivity list for proper implementation
- 
64. The process of imitating one system with another so that the imitating systems accepts the same data, executes same programs and achieves same results as the imitated systems is known as
- (A) Simulation (B) Modification (C) Translation (D) Emulation
-

65. The value of R, L and C in series RLC circuit that resonates at 1.5 KHz and consumes 50W from a 50V ac source operating at the resonant frequency. The bandwidth is 0.75 KHz.
- (A)  $R = 50\Omega$ ,  $L = 10.6\text{mH}$ ,  $C = 1.06\mu\text{F}$   
(B)  $R = 500\Omega$ ,  $L = 10.6\text{mH}$ ,  $C = 10.6\mu\text{F}$   
(C)  $R = 50\Omega$ ,  $L = 1.06\text{mH}$ ,  $C = 10.6\mu\text{F}$   
(D)  $R = 500\Omega$ ,  $L = 1.06\text{mH}$ ,  $C = 1.06\mu\text{F}$
- 
66. When VSWR is 3, the magnitude of the reflection coefficient will be
- (A) 1/4                      (B) 1/3                      (C) 1/2                      (D) 1
- 
67. The conductivity of the intrinsic germanium at 300°K is \_\_\_\_\_. When,  $n_i$  at 300°K =  $2.5 \times 10^{13}/\text{cm}^3$  and  $\mu_n$  and  $\mu_p$  in germanium are 3800 and 1800  $\text{cm}^2/\text{Vs}$  respectively.
- (A) 0.224 S/cm                      (B) 0.0224 S/cm  
(C) 2.24S/cm                      (D) 0.00224 S/cm
- 
68. As compared to a full wave rectifier using 2 diodes, the four diode bridge rectifier has the dominant advantage of
- (A) Higher current carrying                      (B) Lower peak inverse requirement  
(C) Lower ripple factor                      (D) Higher efficiency
- 
69. In a real time system, the simplest scheme that allows the operating system to allocate memory to two processes simultaneously is \_\_\_\_\_.
- (A) Over lays                      (B) Pipeline                      (C) Swapping                      (D) None of the above
- 
70.  $(\cos 5\theta - i \sin 5\theta)^2$  is same as
- (A)  $\cos 10\theta + i \sin 10\theta$                       (B)  $\cos 25\theta - i \sin 25\theta$   
(C)  $(\cos \theta + i \sin \theta)^{-10}$                       (D)  $(\cos \theta - i \sin \theta)^{-10}$
-

71. In case of which of the following, an increase on the modulation index leads to increase in bandwidth  
(A) PM (B) FM (C) AM (D) Both (A) and (B)
- 
72. Four voice signals, each limited to 4 kHz and sampled at Nyquist rate, are converted into binary PCM signal using 256 quantization levels. The bit transmission rate for the time division multiplexing signal will be  
(A) 8 kbps (B) 64 kbps (C) 256 kbps (D) 5126 kbps
- 
73. If a counter having 10 FFs is initially at 0, what count will it hold after 2060 pulses?  
(A) 000 000 1100 (B) 000 001 1100 (C) 000 001 1000 (D) 000 000 1110
- 
74. The output of a circular convolution performed on two signals  
 $x_1(n) = \{2, 1, 2, 1\}$  and  $x_2(n) = \{1, 2, 3, 4\}$  is  
(A)  $\{16, 14, 16, 14\}$  (B)  $\{14, 16, 14, 16\}$   
(C)  $\{12, 14, 12, 14\}$  (D)  $\{14, 12, 14, 12\}$
- 
75. When using a sequential code to design a combinational logic in VHDL, if complete truth table is not defined, the synthesis tool will implement a \_\_\_\_\_ which is not required  
(A) Clock buffer (B) Buffer  
(C) Flip Flop (D) Latch
- 
76. In what order the element of a pushdown stack are accessed?  
(A) First In First Out (FIFO) (B) Last in Last Out (LILO)  
(C) Last In First Out (LIFO) (D) None of the above
-

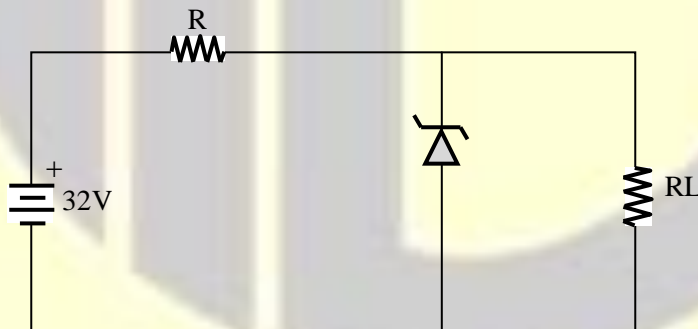
77. What is the value of C such that equivalent capacitance across x-y is 5F



- (A) 20F                      (B) 23F                      (C) 22F                      (D) 21F

78. A wave guide section in a microwave circuit will act as a  
 (A) Low pass filter                      (B) Band pass filter  
 (C) High pass filter                      (D) Band stop filter

79. A 24V, 600mW Zener is to be used for providing a 24V stabilized supply to a variable load. Assume that for proper Zener action, a minimum of 10 mA must flow through the Zener. If the input voltage is 32V, what would be the value of R and the maximum load current?



- (A) 320 ohm, 10mA                      (B) 400 ohm, 15mA  
 (C) 400 ohm, 10mA                      (D) 320 ohm, 15mA

80. The value of x at which y has a minimum for  $y = x^2 - 3x + 1$  is  
 (A)  $-3/2$                       (B)  $3/2$                       (C) 0                      (D) None of these