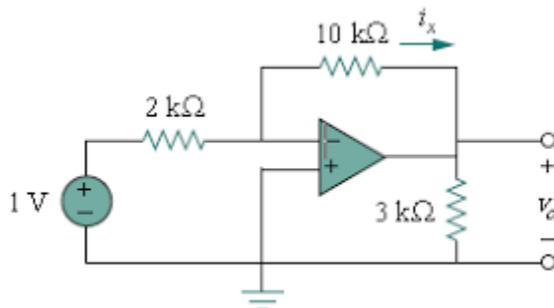


## BARC SAMPLE QUESTION PAPER FOR ELECTRONICS

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1. Differential amplifiers are used in
  - a. instrumentation amplifiers
  - b. voltage followers
  - c. voltage regulators
  - d. buffers

2.



The output voltage  $V_o$  of the above circuit is

- a. -6V
  - b. -5V
  - c. -1.2V
  - d. -0.2V
3. The ideal OP-AMP has the following characteristics.
    - a)  $R_i = \infty$ ,  $A = \infty$ ,  $R_o = 0$
    - b)  $R_i = 0$ ,  $A = \infty$ ,  $R_o = 0$
    - c)  $R_i = \infty$ ,  $A = \infty$ ,  $R_o = \infty$
    - d)  $R_i = 0$ ,  $A = \infty$ ,  $R_o = \infty$

4. . How many op-amps are required to implement this equation

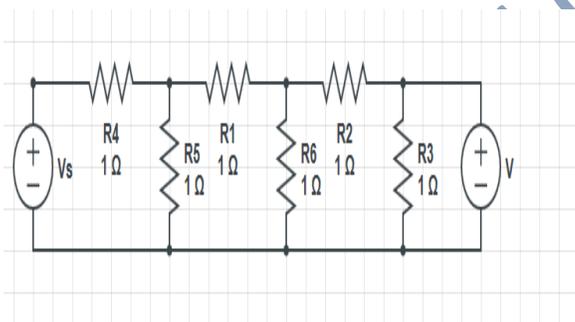
$$V_o = - \left( \frac{R_f}{R_1} V_1 + \frac{R_f}{R_2} V_2 + \frac{R_f}{R_3} V_3 \right)$$

- A. 2  
B. 3  
C. 4  
D. 1
5. A very brief, high voltage spike on an ac power line is called as  
A. A bleeder  
B. An arc  
C. A transient  
D. An avalanche  
E. A clipped peak
6. You can find the zener diode in  
A. The mixer in a superheterodyne receiver  
B. The PLL in a circuit for detecting FM  
C. The product detector in a receiver for SSB  
D. The voltage regulator in a power supply  
E. The AF oscillator in an AFSK transmitter
7. A network function can be completely specified by:  
(A) Real parts of zeros  
(B) Poles and zeros  
(C) Real parts of poles  
(D) Poles, zeros and a scale factor
8. A unit impulse voltage is applied to one port network having two linear components. If the current through the network is 0 for  $t < 0$  and decays exponentially for  $t > 0$  then the network consists of  
(A) R and L in series  
(B) R and L in parallel  
(C) R and C in parallel  
(D) R and C in series

9. The Q-factor of a parallel resonance circuit consisting of an inductance of value 1mH, capacitance of value  $10^{-5}$ F and a resistance of 100 ohms is
- (A) 1
  - (B) 10
  - (C)  $\pi 20$
  - (D) 100
10. In a travelling electromagnetic wave, E and H vector fields are
- (A) perpendicular in space .
  - (B) parallel in space.
  - (C) E is in the direction of wave travel.
  - (D) H is in the direction of wave travel.
11. The lower cut-off frequency of a rectangular waveguide with inside dimensions (3 × 4.5 cm) operating at 10 GHz is
- (A) 10 GHz.
  - (B) 9 GHz.
  - (C) 10/9GHz.
  - (D) 10/3GHz.
12. The intrinsic impedance of free space is
- (A) 75 ohm.
  - (B) 73 ohm.
  - (C)  $120 \pi$  ohm.
  - (D) 377ohm.
13. Which one of the following conditions will not gurantee a distortionless transmission line
- (A)  $R = 0 = G$
  - (B)  $RC = LG$
  - (C) very low frequency range ( $R \gg \omega L, G \gg \omega C$ )
  - (D) very high frequency range ( $R \ll \omega L, G \ll \omega C$ )
14. MOSFET can be used as a

- (a) current controlled capacitor (b) voltage controlled capacitor  
(c) current controlled inductor (d) voltage controlled inductors

15. In a common emitter, unbypassed resistor provides
- (a) voltage shunt feedback (b) current series feedback  
(c) negative voltage feedback (d) positive current feedback
16. Introducing a resistor in the emitter of a common amplifier stabilizes the dc operating point against variations in
- a) Only the temperature b) only the  $\beta$  of the transistor  
c) Both Temperature &  $\beta$  d) None of the above
17. For the circuit shown in Fig.4, the voltage across the last resistor is  $V$ . All resistors are of  $1\ \Omega$ . The  $V_s$  is given by



- (A) 13V. (B) 8V.  
(C) 4V. (D) 1V.

18. The network has a network function  $Z(s) = \frac{s(s+2)}{(s+3)(s+4)}$
- (A) not a positive real function. (B) RL network.  
(C) RC network. (D) LC network.

19. For a series R-C circuit excited by a d-c voltage of 10V, and with time-constant  $\tau$ , the voltage across C at time  $\tau = t$  is given by

- A.  $10(1 - e^{-1})$  v

- B.  $10(2-e^{-2})$  v
- C.  $10-e^{-1}$  volts
- D.  $1-e^{-1}$

20. A 2 port network using Z parameter representation is said to be reciprocal if

- A.  $Z_{11} = Z_{22}$
- B.  $Z_{12} = Z_{21}$
- C.  $Z_{12} = -Z_{21}$
- D.  $Z_{11} - 2Z_{22} = 0$

21. Consider a transmission line of characteristic impedance 50 ohms and the line is terminated at one end by +j50 ohms, the VSWR produced in the transmission line will be

- (A) +1
- (B) zero
- (C) infinity
- (D) -1

22. In a certain medium  $E = 10 \cos(10^8 t - 3y) a_x$  V/m. What type of medium is it?

- (A) Free space
- (B) Lossy dielectric
- (C) Lossless dielectric
- (D) Perfect conductor

23. If  $D \cdot \nabla = \epsilon \nabla \cdot E$  and  $\nabla \cdot J = \sigma \nabla \cdot E$  in a given material, the material is said to be

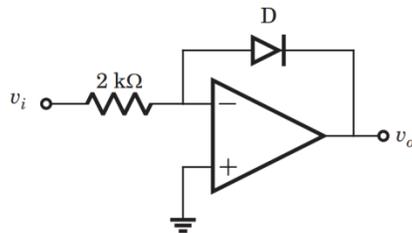
- (A) Linear
- (B) Homogeneous
- (C) Isotropic
- (D) Linear & Homogeneous

24. For a  $300 \Omega$  antenna operating with 5A of current, the radiated power is

- (A) 7500 W
- (B) 750 W

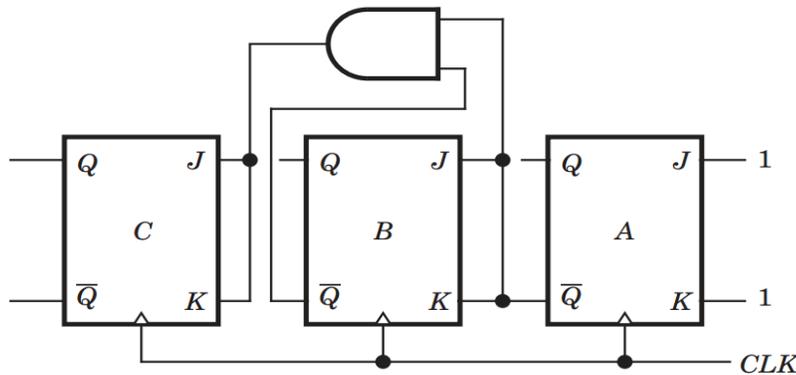


30. A super heterodyne receiver is designed to receive transmitted signals between 5 and 10 MHz. High-side tuning is to be used. The tuning range of the local oscillator for IF frequency 500 kHz would be
- (A) 4.5 MHz - 9.5 MHz      (B) 5.5 MHz - 10.5 MHz  
(C) 4.5 MHz - 10.5 MHz      (D) none of these
31. An analog signal is sampled at 36 kHz and quantized into 256 levels. The time duration of a bit of the binary coded signal is:
- (A) 5.78 $\mu$ s      (B) 3.47 $\mu$ s  
(C) 6.43 ms      (D) 7.86 ms
32. The minimum sampling frequency (in samples/sec) required to reconstruct the following signal from its samples without distortion would be  $x(t) = 5(\sin 2\pi 1000t/\pi)^3 + 7(\sin 2\pi 1000t/\pi)^2$
- (A)  $2 \times 10^3$       (B)  $4 \times 10^3$   
(C)  $6 \times 10^3$       (D)  $8 \times 10^3$
33. Three identical amplifier, each having a spot effective input noise temperature of 125 K and available power G are cascaded. The overall spot effective input noise temperature of the cascade is 155 K. The G is
- (A) 3      (B) 5  
(C) 7      (D) 9
34. In the Op-Amp circuit shown, assume that the diode current follows the equation  $I = I_s \exp(V/V_t)$   $V_i = 2V$ ,  $V_o = V_{o1}$  and for  $V_i = 4V$ ,  $V_o = V_{o2}$ . The relationship between  $V_{o1}$  and  $V_{o2}$  is



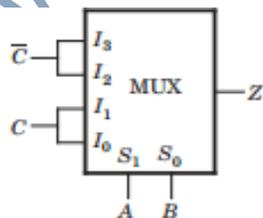
- (A)  $V_{O2} = \sqrt{2} V_{O1}$
- (B)  $V_{O2} = e^2 V_{O1}$
- (C)  $V_{O2} = V_{O1} \ln 2$
- (D)  $V_{O1} - V_{O2} = V_t \ln 2$

35. The counter shown in fig. below is a



- (A) MOD-8 up counter
- (B) MOD-8 down counter
- (C) MOD-6 up counter
- (D) MOD-6 down counter

36. The MUX shown in fig. multiplexer. The output Z is



- (A) A xor C
- (B) A and C
- (C) B xor C
- (D) B and C