ELECTRONIC SCIENCE

Paper II

Time Allowed : 75 Minutes] **[Maximum Marks : 100**

Note : This Paper contains Fifty (50) multiple choice questions, each question carrying Two (2) marks. Attempt *All* questions.

1. In a p-n junction, p-type region is heavily doped as a result :

   (A) depletion width extends in n-type region

   (B) depletion width extends in p-type region

   (C) depletion width is unaffected

   (D) depletion width reduces

2. The diffusion process in a p-n junction device occurs due to :

   (A) Ambient temperature

   (B) Applied voltage

   (C) Covalent bonds

   (D) Concentration gradient of charges

3. What is the function of SiO_2 layer in MOSFET ?

   (A) To provide high input resistance

   (B) To increase current concentration

   (C) To provide high output resistance

   (D) To provide low output resistance

4. Compared to bipolar junction transistor, a JFET has :

   (A) lower input impedance

   (B) higher input impedance and high voltage gain

   (C) higher voltage gain

   (D) high input impedance and low voltage gain

5. Which of the following lithography techniques gives best resolution ?

(A) UV Lithography

(B) E-beam Lithography

(C) X-ray Lithography

(D) Laser Lithography

6. Superposition theorem is valid only for :

(A) linear circuits

(B) non-linear circuits

(C) both linear and non-linear circuits

(D) circuits containing current circuits

7. The Laplace transform of cosh ωt is :

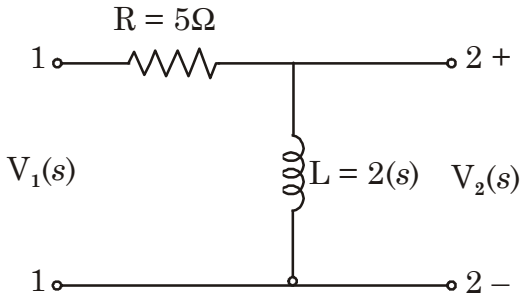
(A) $\frac{s}{s^2 + \omega^2}$

(B) $\frac{s}{s^2 - \omega^2}$

(C) $\frac{\omega}{s^2 + \omega^2}$

(D) $\frac{\omega}{s^2 - D^2}$

8. Show how many poles this network has in its driving point impedance ?



(A) Zero

(B) One at origin

(C) One at infinity

(D) One on $j\omega$ axis

9. How is z_{22} related to h-parameters ?

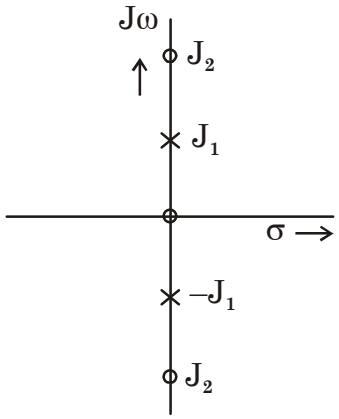
(A) $z_{22} = h_{22}$

(B) $z_{22} = \frac{1}{h_{22}}$

(C) $z_{22} = \frac{h_{21}}{h_{22}}$

(D) $z_{22} = -\frac{h_{21}}{h_{22}}$

10. The pole-zero pattern of a filter is shown in figure. The filter is :



(A) low pass

(B) high pass

(C) band pass

(D) all pass

11. In a bridge rectifier the secondary voltage is 100 V, what should be the minimum PIV for each diode ?

(A) 100 V

(B) 141.4 V

(C) 200 V

(D) 282.8 V

12. An amplifier has a voltage gain of A_V = 40 and 10% of the output is fedback. The gain with feedback is :

(A) 40

(B) 32

(C) 16

(D) 8

13. In a CE small signal amplifier, the resistor R_E is bypassed by a capacitor C_E. The input impedance of this configuration is :

(A) h_{fe}

(B) R_E

(C) $h_{ie} + (1 + h_{fe})R_E$

(D) $(1 + h_{fe})R_E$

14. When a large sine wave drives a Schmitt trigger, the output is a :

(A) rectangular wave

(B) triangular wave

(C) rectified sine wave

(D) series of ramps

15. Slew rate of op-amp becomes important :

(A) at low frequency

(B) at high frequency

(C) at low input voltage

(D) at high input voltage

16. The main advantage of CMOS is :

(A) Low power, high device density

(B) High speed, high device density

(C) Low power, low device density

(D) High speed, low device density

17. $Y = ABC + AB\overline{C} + 1$, the output Y will be :

(A) zero

(B) AB

(C) 1

(D) ABC

18. A CMOS D latch is transparent, when :

(A) EN = 0

(B) EN = 1

(C) EN = tristate

(D) Independent of EN

19. A 64 kB memory device will have :

(A) 16 address lines and 8 data lines

(B) 20 address lines and 4 data lines

(C) 64 address lines and 8 data lines

(D) 16 address lines and 16 data lines

20. An eightbit flash ADC is implemented using :

(A) 8 comparators

(B) 16 comparators

(C) 64 comparators

(D) 256 comparators

21. The register used in variable port addressing in 8086 is :

(A) AX

(B) BX

(C) CX

(D) DX

22. Address within a segment of 8086 is called :

(A) effective address

(B) physical address

(C) segment address

(D) base address

23. Which of the following I/O device provides memory and I/O compatible signal ?

(A) 8255

(B) 8279

(C) 8253

(D) 8155

24. After power up in 8051 the first location of the stack variable is :

(A) 07H

(B) 08H

(C) 09H

(D) 04H

25. Preferred protocol for long distance communication is :

(A) parallel

(B) serial

(C) error handling

(D) digital

26. "My salary was increased by 15% !" Select the statement which will exactly reproduce the line of text above.

(A) printf("\" My salary was increased by 15/% \!\ "\n");

(B) printf("My salary was increased by 15% !\ n");

(C) printf("My salary was increased by 15 '%' !\n");

(D) printf("\" My salary was increased by 15%% ! "\n");

27. int X = 2 * 3 + 4 * 5;

What value will X contain in the sample code above ?

(A) 22

(B) 26

(C) 46

(D) 70

28. Array passed as an argument to a function is interpreted as :

(A) Address of the array

(B) Value of the first element of the array

(C) Address of the first element of the array

(D) Number of elements of the array

29. Which of the following is the *correct* way of declaring a float pointer ?

(A) float ptr;

(B) float * ptr;

(C) * float ptr;

(D) float ptr*;

30. Which one of the following will read a character from keyboard and will store it in the variable C ?

(A) C=getc( );

(B) getc(&c);

(C) C=getchar(stdin);

(D) C=getchar( );

31. An electromagnetic wave in a medium with permittivity $\in$ and permeability μ travels with a speed :

(A) $\sqrt{\in \mu}$

(B) $\frac{1}{\sqrt{\in \mu}}$

(C) $\sqrt{\frac{\in}{\mu}}$

(D) $\sqrt{\frac{\mu}{\in}}$

32. Poynting vector represents :

(A) direction of propagation of EM waves

(B) direction of displacement current

(C) polarization vector

(D) equipotential surface

33. The characteristic impedance of a transmission line is 100 Ω, which is terminated into a load of 900 Ω. A $\frac{\lambda}{4}$ transformer is to be added for matching the impedance. Its characteristic impedance should be :

(A) 500 Ω

(B) 700 Ω

(C) 900 Ω

(D) 300 Ω

34. Increase in number of directors in Yagi antenna :

(A) increases the bandwidth

(B) decreases the bandwidth

(C) decreases the gain

(D) increases null points

35. When a plane polarized wave is incident on a conducting surface, the magnetic field at the interface is :

(A) zero

(B) same as in the incident wave

(C) double that of the incident wave

(D) that of the incident wave

36. The frequency bandwidth required is largest for :

(A) amplitude modulation

(B) frequency modulation

(C) digital modulation

(D) FSK modulation

37. If 10 speech channels are multiplexed in a TDM-PCM telephone system and the signals are sampled at 8 kHz rate. Then separation time between two frames will be :

(A) 12.5 μ sec.

(B) 15.0 μ sec.

(C) 1.25 μ sec.

(D) 125 μ sec.

38. What makes optical fiber immune to EMI ?

(A) They transmit signal as electric current rather than light

(B) It has plastic cover on it

(C) Because it uses glass or polymer as propagation medium

(D) They transmit signal as light rather than electric current

39. Microwave link repeaters are typically 50 km apart :

(A) because of atmospheric attenuation

(B) because of earth's curvature

(C) because of output power limitation of transmitter

(D) to ensure that the applied d.c. voltage is not excessive

40. Figure of merit of digital communication system is primarily determined by :

(A) SNR and probability P_e

(B) Bandwidth and signalling rate r_s

(C) Error probability and signalling rate

(D) SNR and bandwidth

41. In the reverse direction the characteristics of a thyristor resembles to characteristics of a :

(A) transistor switch

(B) p-n rectifier

(C) negative resistance

(D) two transistor model

42. For a UJT $R_{B_1} = 6\ k\Omega$, $R_{B_2} = 3 k\Omega$ the intrinsic stand-off ratio will be :

(A) 0.55

(B) 0.33

(C) 0.66

(D) 0.44

43. Stimulated emission is observed in the case of a :

(A) Discharge tube

(B) LED

(C) Laser

(D) Sun

44. An illuminated solar cell operates on I-V plot with voltage along X-axis in the :

(A) 1st

(B) 2nd

(C) 3rd

(D) 4th quadrant

45. Total internal reflection occurs when light travels from :

(A) denser to lighter medium

(B) lighter to denser with incident angle > critical angle

(C) denser to lighter with incident angle < critical angle

(D) lighter to denser medium

46. Which of the following forms of temperature sensor produces a large change in its resistance with temperature but is very non-linear ?

(A) a thermistor

(B) platinum resistance thermometer

(C) p-n junction sensor

(D) pyroelectric sensor

47. How many significant figures are present in the number 10,450 ?

(A) three

(B) four

(C) five

(D) ten

48. Which of the following equipments is used to study the topography of the sample ?

(A) X-ray Diffractometer

(B) Spectrophotometer

(C) Spectrum Analyser

(D) Scanning Electron Microscope

49. A system is said to be stable if and only if :

(A) all poles lie on the right half of s-plane

(B) all poles lie in the left half of s-plane

(C) all poles and zero lie on the right half of s-plane

(D) some poles lie on the right half of s-plane and some lie on the left half of s-plane

50. The problem with PI controller is, its response to transients is :

(A) very fast

(B) having a dead zone

(C) non-linear

(D) Sluggish

ROUGH WORK

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