



Punjab Technical University

Maximum Marks: 90

Time: 90Mins.

Entrance Test for Enrollment in Ph.D Programme

Important Instructions

- Fill all the information in various columns, in Capital letters, with blue/black point pen for attempting the questions
- Use of calculators is not allowed.
- Make attempt by writing the answer in capital Letters in the box against each question number.
- All questions are compulsory. Each Question has only one right answer. No Negative marking for wrong answers.
- Questions attempted with two or more options/answers will not be evaluated.

Stream:Engineering.....

DisciplineElectronic and Communication Engineering

Name

Fathers Name

Roll Number **Date: 13-07-2014**

Signature of Candidate:

Signature of Invigilator

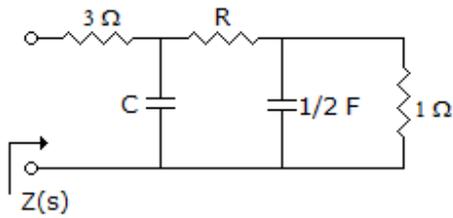
1. For a transmission line open circuit and short circuit impedances are 20Ω and 5Ω . Then characteristic impedance is

- A. 100Ω
- B. 50Ω
- C. 25Ω
- D. 10Ω

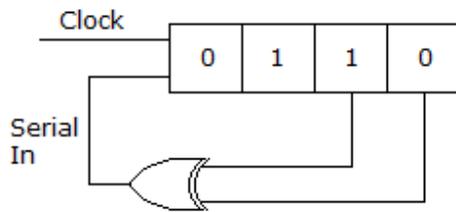
2. Z(c) for the network shown in the figure is

$$\frac{3(s^2 + 6s + 8)}{s^2 + 4s + 3}$$

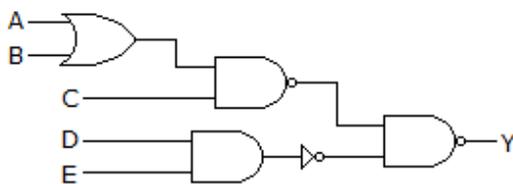
The value of C and R are, respectively



- A. $1/6\ \text{F}$ and $4\ \Omega$
 B. $2/9\ \text{F}$ and $9/2\ \Omega$
 C. $2/3\ \text{F}$ and $1/2\ \Omega$
 D. $1/2\ \text{F}$ and $1\ \Omega$
3. A $1\ \mu\text{F}$ capacitor is connected to $12\ \text{V}$ battery. The energy stored in the capacitor is
- A. $12 \times 10^{-6}\ \text{J}$
 B. $24 \times 10^{-6}\ \text{J}$
 C. $48 \times 10^{-6}\ \text{J}$
 D. $72 \times 10^{-6}\ \text{J}$
4. A coil has resistance R and inductance L . At $\omega = \infty$ the phase angle between voltage and current is
- A. 0°
 B. 180°
 C. 45°
 D. 90°
5. Assertion (A): The output of a NOR gate is equal to the complement of OR of input variables.
 Reason (R): A XOR gate is a universal gate.
- A. Both A and R are correct and R is correct explanation of A
 B. Both A and R are correct but R is not correct explanation of A
 C. A is true, R is false
 D. A is false, R is true
6. Out of latch and flip flop, which has clock input?
- A. Latch only
 B. Flip flop only
 C. Both latch and flip flop
 D. None
7. In the given figure shows a 4 bit serial in parallel out right shift register. The initial contents as shown are 0110. After 3 clock pulses the contents will be



- A. 0000
 - B. 0101
 - C. 1010
 - D. 1111
8. In digital circuits Schottky transistors are preferred over normal transistors because of their
- A. lower propagation delay
 - B. lower power dissipation
 - C. higher propagation delay
 - D. higher power dissipation
9. The first machine cycle of an instruction is always
- A. a memory read cycle
 - B. a fetch cycle
 - C. a input/output read cycle
 - D. a memory write cycle
10. A 4 bit ripple counter starts in 0000 state. When the counter reads 0010 the number of clock pulses which have occurred is
- A. 2
 - B. 18
 - C. 2 or 18
 - D. 2 or 18 or 34
11. Which one of the following can be used as parallel to series converter?
- A. Decoder
 - B. Digital counter
 - C. Multiplexer
 - D. Demultiplexer
12. In the given figure, Y =



- A. $(A + B)C + DE$

- B. $AB + C(D + E)$
- C. $(A + B)C + D + E$
- D. none of the above

13. Assertion (A): In 8085 WR and RD signals are active high.

Reason (R): LOW WR means write operation and low RD means read operation.

- A. Both A and R are correct and R is correct explanation of A
- B. Both A and R are correct but R is not correct explanation of A
- C. A is correct R is wrong
- D. A is wrong R is correct

14. The signals in 8086 are classified into

- A. minimum mode and maximum mode
- B. decrement mode and increment mode
- C. low mode and high mode
- D. none of the above

15. Consider the following statements

1. A total of about 1 million bytes can be directly accessed by 8086 microprocessor.
2. The 8086 has thirteen 16 bit registers.
3. The 8086 has eight flags.
4. Compared to 8086, the 80286 provides a higher degree of memory protection.

Of the above statements

- A. 1, 2, 3, 4 are correct
- B. 1, 3, 4 are correct
- C. 1, 2, 4 are correct
- D. 1, 2, 3 are correct

16. In which group of 8085 instructions condition flags are not affected?

- A. Data transfer group
- B. Arithmetic group
- C. Logical group
- D. Both (a) and (c)

17. What is the addressing mode used in the instruction LDA 0345 H ?

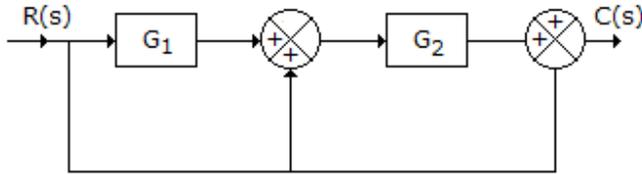
- A. Direct
- B. Indirect
- C. Implied
- D. Immediate.

18. In 8085 which addressing mode is also called inherent addressing?

- A. Direct
- B. Register

- C. Implicit
- D. Immediate

19. For the system in the given figure. The transfer function $C(s)/R(s)$ is



- A. $G_1 + G_2 + 1$
- B. $G_1 G_2 + 1$
- C. $G_1 G_2 + G_2 + 1$
- D. $G_1 G_2 + G_1 + 1$

20. In control systems the magnitude of error voltage

- A. is very small
- B. is very large
- C. neither small nor large
- D. may be any value from 0 to 50 V

21. Assertion (A): The time response of the system with

$$G(s) = \frac{36}{s^2 + 36s + 36}$$

will not have any overshoot for unit step input.

Reason (R): A critically damped system does not have any overshoot to a unit step input.

- A. Both A and R are correct and R is correct explanation of A
- B. Both A and R are correct but R is not correct explanation of A
- C. A is correct but R is wrong
- D. R is correct but A is wrong

22. For underdamped second order systems the rise time is the time required for the response to rise from

- A. 0% to 100% of its final value
- B. 10% to 90% of its final value
- C. 5% to 95% of its final value
- D. either (a) or (b)

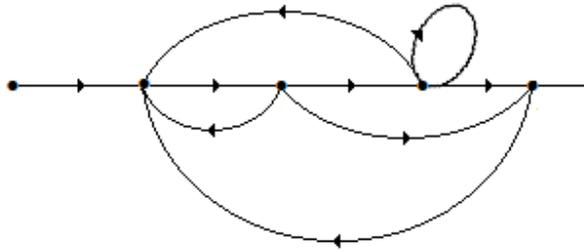
23. The static equation of a system is

$$\dot{X} = \begin{bmatrix} 0 & 1 \\ -20 & -9 \end{bmatrix} X + \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

The poles of this system are located at

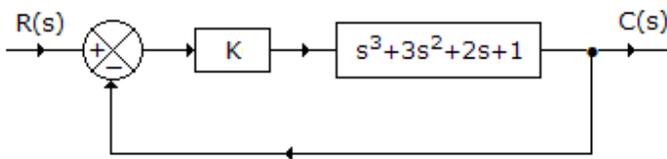
- A. -1, -9
- B. -1, -20
- C. -4, -5
- D. -9, -20

24. In the given figure, the combinations of two non-touching loops is



- A. 1
- B. 2
- C. 3
- D. 4

25. The given figure shows a control system. The maximum value of gain for which the system is stable is

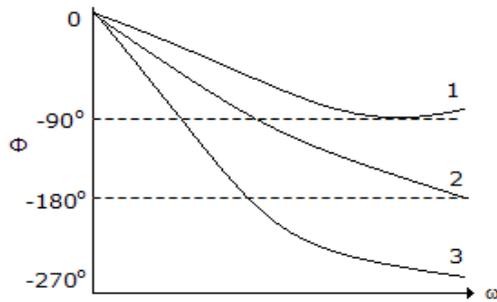


- A. $\sqrt{3}$
- B. 3
- C. 4
- D. 5

26. PN – junction is heavily doped in case of

- A. PIN diodes
- B. Tunnel diodes
- C. Gunn Diodes
- D. All of the Above

27. In the given figure, the curves 1, 2, 3 are respectively for



- A. all pass, minimum phase and non-minimum phase functions
- B. minimum phase, all pass and non-minimum phase functions
- C. non-minimum phase, all pass and minimum phase functions
- D. minimum phase, non-minimum phase and all pass functions

28. Assertion (A): If points at infinity are included, $G(s)$ has same number of poles and zeros.

Reason (R): The function

$$G(s) = \frac{K(s + 2)}{(s + 5)^2}$$

has a zero at $s = -2$.

- A. Both A and R are correct and R is correct explanation of A
- B. Both A and R are correct but R is not correct explanation of A
- C. A is correct but R is wrong
- D. R is correct but A is wrong

29. A 400 W carrier is amplitude modulated with $m = 0.75$. The total power in AM is

- A. 400 W
- B. 512 W
- C. 588 W
- D. 650 W

30. To relay outdoor remotely located live programs, TV transmitter use

- A. microwave links
- B. coaxial cable link
- C. open wire link
- D. either (b) or (c)

31. The receiver of a pulsed RADAR can detect signal power in the order of

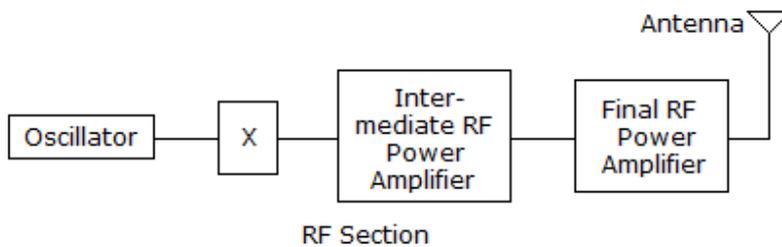
- A. 1 W
- B. 0.1 W
- C. 10⁻⁵ W
- D. 10⁻¹² W

32. Resonant circuits are used in

- A. audio amplifiers

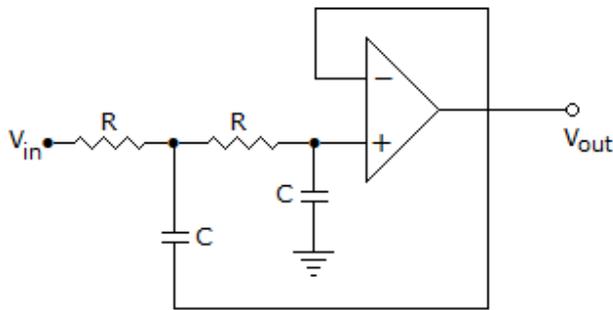
- B. RF amplifiers
 - C. both audio and RF amplifiers
 - D. none of the above
33. Which of the following statement is correct
- A. FET and Junction Transistors both are unipolar
 - B. FET and Junction Transistors both are bipolar
 - C. FET is bipolar, while Junction Transistors are unipolar
 - D. FET is unipolar, while Junction Transistors are bipolar.
34. In a two tone AM system the two modulating frequencies are 2000π and 4000π rad/sec. If carrier frequency is $2\pi \times 10^6$ rad/sec, the frequencies of upper sidebands are
- A. 1.002 MHz and 1.004 MHz
 - B. 1.001 MHz and 1.002 MHz
 - C. 1.001 MHz and 1.004 MHz
 - D. 1.002 MHz and 1.008 MHz
35. The resonant frequency of an RF amplifier is 1 MHz and its bandwidth is 10 kHz. The Q factor will be
- A. 10
 - B. 100
 - C. 0.01
 - D. 0.1
36. An S/N ratio of 3 expressed in db is
- A. 4.8 dB
 - B. 2.4 dB
 - C. 0.48 dB
 - D. 0.24 dB
37. The distance of a direct broadcasting satellite from earth's surface is about
- A. 1000 km
 - B. 10000 km
 - C. 36000 km
 - D. 55000 km
38. The main advantage of TDM over FDM is that it
- A. needs less power
 - B. needs less bandwidth
 - C. needs simple circuitry
 - D. gives better S/N ratio
39. The modulation index of an FM is changed from 0 to 1. How does the transmitted power change?
- A. Gets halved

- B. Gets doubled
 - C. Gets increased by 50 percent
 - D. Remains unchanged
40. At a given probability of error, binary coherent FSK is inferior to binary coherent PSK by
- A. 6 dB
 - B. 3 dB
 - C. 2 dB
 - D. 0 dB
41. Which of the following is an oscillator with best frequency stability?
- A. Crystal oscillator
 - B. Clapp oscillator
 - C. Phase shift circuit
 - D. Multivibrator
42. BPSK stands for
- A. Binary Phase Shifting Key
 - B. Broad Phase Shifting Key
 - C. Bit Phase Shifting Key
 - D. Binary Pulse Shifting Key
43. The block diagram of AM transmitter in which high level modulation is used as shown in figure. The block X could be

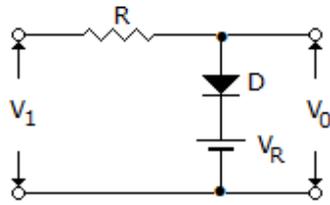


- A. audio power amplifier
 - B. buffer RF amplifier
 - C. compressor amplifier
 - D. none of the above
44. In a circular waveguide the dominant mode is
- A. TE_{01}
 - B. TE_{11}
 - C. TE_{20}
 - D. TE_{21}
45. The AM, PM, and TV broadcast frequencies are
- A. of the same order as microwave range
 - B. much lower than microwave range

- C. much higher than microwave range
 - D. either (a) or (c)
46. The function of a modulator is to
- A. separate two frequencies
 - B. extract information from the carrier
 - C. amplify the audio frequency signal
 - D. impress the information on to a RF carrier
47. For FM, which of the following statement is not true?
- A. The bandwidth increases as modulation index is increased
 - B. The total power remains constant with respect to modulation index
 - C. The carrier never becomes zero
 - D. All of the above
48. Which of following is digital modulation technique?
- A. ASK
 - B. FSK
 - C. PSK
 - D. All
49. A half wave diode rectifier has a capacitance input filter. If input voltage is $V_m \sin \omega t$, PIV is
- A. V_m
 - B. $2 V_m$
 - C. $3 V_m$
 - D. $4 V_m$
50. The open loop gain of an amplifier is 200. If negative feedback with $\beta = 0.2$ is used, the closed loop gain will be
- A. 200
 - B. 40.12
 - C. 4.878
 - D. 2.2
51. Two CE stages, 1 and 2 are coupled through a capacitor. VCC is the same for both. Base resistances RB1 and RB2 are such that $R_{B1} > R_{B2}$. Then
- A. base currents for both stages are equal
 - B. base current of stage 1 is more than that of stage 2
 - C. base current of stage 2 is more than that of stage 1
 - D. either (b) or (c)
52. The circuit in the given figure is



- A. low pass filter
 - B. high pass filter
 - C. band Pass filter
 - D. band reject filter
53. Which configuration is suitable for impedance matching?
- A. CB
 - B. CE
 - C. CC
 - D. CB and CE
54. A BJT is said to be operating in saturation region if
- A. both junctions are reverse biased
 - B. both junctions are forward biased
 - C. base emitter junction is forward biased and base collector junction is reverse biased
 - D. base collector junction is forward biased and base emitter junction is reverse biased
55. In a power amplifier the collector current flows for 270° of the input cycle. The operations is
- A. class A
 - B. class B
 - C. class AB
 - D. class C
56. When a transistor is connected in common emitter mode, it will have
- A. negligible input resistance and high output resistance
 - B. high input resistance and low output resistance
 - C. medium input resistance and high output resistance
 - D. low input resistance as well as output resistance
57. A junction Field Effect Transistor can operate in
- A. depletion mode only
 - B. enhancement mode only
 - C. depletion and enhancement modes
 - D. neither depletion nor enhancement modes
58. The circuit shown in figure will act as



- A. differentiator
- B. adder
- C. clipper
- D. clamper

59. If transfer function of a system is $H(z) = 6 + z^{-1} + z^{-2}$ then system is

- A. minimum phase
- B. maximum phase
- C. mixed phase
- D. none

60. What about the stability of system in

$$H(z) = \frac{z(3z - 4)}{(z - 0.4)(z - 2)}$$

- A. system is stable
- B. unstable
- C. stable at 0.4
- D. cant say

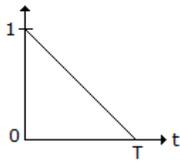
61. If Laplace transform of $f(t)$ is $F(s)$, then $\mathcal{L}\{f(t - a)u(t - a)\}$ is

- A. $e^{as} F(s)$
- B. $e^{-as} F(s)$
- C. $-e^{as} F(s)$
- D. $-e^{-as} F(s)$

62. The inverse Laplace transform of $\frac{-a}{s(s - a)}$

- A. e^{at}
- B. $-e^{at}$
- C. $1 - e^{at}$
- D. $-1 + e^{at}$

63. Which of the following is the correct Laplace transform of the signal shown in the given figure



A. $\frac{1}{Ts^2}[1 - e^{-Ts}(1 + Ts)]$

B. $\frac{1}{Ts^2}[e^{-Ts}(-1 + Ts)]$

C. $\frac{1}{Ts^2}[e^{-Ts} + (1 - Ts)]$

D. $\frac{1}{Ts^2}[1 - e^{-Ts} + Ts]$

64. For the differential equation $(D^3 - D^2 + D - 1)[y(t)] = 0$, the roots of auxiliary equation are

- A. $-j, j, 1$
- B. $-j, j, 2$
- C. $1, 2, j$
- D. $1, 2, -j$

65. $F(s) = \frac{1}{(s + a)^4}$

$f(t) =$

A. $\frac{te^{-at}}{6}$

B. $\frac{t^2e^{-at}}{6}$

C. $\frac{t^3e^{-at}}{6}$

D. $\frac{t^4e^{-at}}{6}$

66. Which of the following expressions is in the sum-of-products (SOP) form?

- A. $(A + B)(C + D)$
- B. $(A)B(CD)$
- C. $AB(CD)$
- D. $AB + CD$

67. A stationary process has

- A. all statistical properties independent of time
- B. all statistical properties dependent of time
- C. zero variance
- D. ensemble average equal to time average

68. The total area under the probability distribution curve is

- A. 1
- B. 0
- C. depend upon curve equation
- D. ∞

69. In which of these is reverse recovery time nearly zero?

- A. Zener diode
- B. Tunnel diode
- C. Schottky diode
- D. PIN diode

70. A potential of 7 V is applied to a silicon diode. A resistance of 1 K ohm is also in series with the diode. The current is

- A. 7 mA
- B. 6.3 mA
- C. 0.7 mA
- D. 0

71. Which of the following is used for generating time varying wave forms?

- A. MOSFET
- B. PIN diode
- C. Tunnel diode
- D. UJT

72. In an n channel MOSFET, the substrate is connected

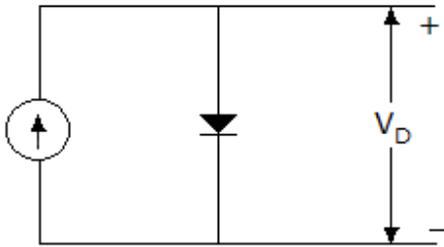
- A. to negative terminal of battery
- B. to positive terminal of battery
- C. to either positive or negative terminal of battery
- D. none of the above

73. In a varactor diode the increase in width of depletion layer results in

- A. decrease in capacitance
- B. increase in capacitance
- C. no change in capacitance
- D. either (a) or (b)

74. In given figure a silicon diode is carrying a constant current of 1 mA. When the temperature of the

diode is 20°C , V_D is found to be 700 mV. If the temperature rises to 40°C , V_D becomes approximately equal to



- A. 747 mV
 - B. 660 mV
 - C. 680 mV
 - D. 700 mV
75. A JFET operates in ohmic region when
- A. $V_{GS} = 0$
 - B. V_{GS} is less than pinch off voltage
 - C. V_{GS} is Positive
 - D. $V_{GS} = V_{DS}$
76. Which quantity controls the effectiveness of LED in emitting light?
- A. Applied voltage
 - B. Current
 - C. Extent of doping
 - D. Temperature
77. Peak inverse voltage will be highest for
- A. half wave rectifier
 - B. full wave rectifier
 - C. bridge rectifier
 - D. three phase full wave rectifier
78. A silicon diode is forward biased and total applied voltage is 5 V. The voltage across p-n junction is
- A. 5 V
 - B. Slightly less than 5 V
 - C. 0.7 V
 - D. 0
79. Poynting vector is associated with which of the following?
- A. Power flow in electromagnetic
 - B. Flux in magnetic field
 - C. Charge in electrostatic field
 - D. Current in electrostatic field
80. Maximum effective aperture of an antenna which is operating at a wavelength of 3 meters and has a

directivity of 100

- A. 71.68 m²
- B. 716 m²
- C. 7.16 m²
- D. 71.6 m²

81. A transmission line has characteristics impedance of $(75 + j 0.01) \Omega$ and is terminated in a load impedance of $(70 + j 50) \Omega$. The transmission coefficient will be

- A. $1.70 - j 2.97$
- B. $0.08 + j 0.32$
- C. $1.32 + j 1.38$
- D. $1.08 + j 0.32$

82. The distance between maxima and minima of a standing wave is

- A. $\lambda/4$
- B. $\lambda/2$
- C. λ
- D. 2λ

83. In a line VSWR of a load is 6 dB. The reflection coefficient will be

- A. 0.033
- B. 0.33
- C. 0.66
- D. 3.3

84. The equation $\nabla \cdot J = 0$ is called

- A. Poisson's equation
- B. Kirchoff's node equation
- C. Continuity equation for static currents
- D. Continuity equation for sampling currents

85. The attenuation in waveguide above cut off frequency is

- A. very high
- B. very low
- C. zero
- D. infinite

86. For TE or TM modes of propagation in bounded media, the phase velocity

- A. is independent of frequency
- B. is a linear function of frequency
- C. is a non-linear function of frequency
- D. can be frequency dependent or frequency independent on the source

87. The attenuation constant in case of a transmission line is

A. $\frac{1}{2} \left[L \sqrt{\frac{G}{R}} + C \sqrt{\frac{R}{G}} \right]$

B. $2 \left[L \sqrt{\frac{G}{R}} + C \sqrt{\frac{R}{G}} \right]$

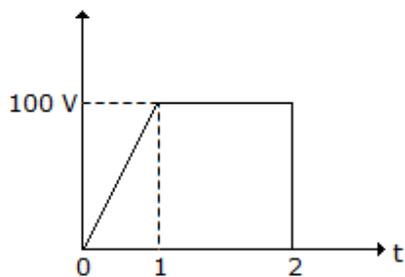
C. $\frac{1}{2} \left[R \sqrt{\frac{C}{L}} + G \sqrt{\frac{L}{C}} \right]$

D. $2 \left[R \sqrt{\frac{C}{L}} + G \sqrt{\frac{L}{C}} \right]$

88. Which of the following laws of electromagnetic theory is associated with the force experienced by two loops of a wire carrying currents?

- A. Maxwell's law
- B. Coulomb's law
- C. Ampere's law
- D. Laplace's law

89. The rms value of wave in figure is



- A. about 95 V
- B. about 80 V
- C. about 50 V
- D. about 25 V

90. An RLC series circuit is underdamped. To make it overdamped, the value of R

- A. has to be increased
- B. has to be decreased
- C. has to be increased to infinity
- D. has to be reduced to zero