ELECTRONICS & COMMUNICATION ENGINEERING

Marks: 100 **Time:** 2 hours

NOTE:

(i) Attempt all questions. Each question carries one mark. There will be **NO** negative marking.

(ii) **There are 40 questions in this booklet.** Against each question four alternative choices (A), (B), (C) and (D) are given, out of which only one is correct. Indicate your choice of answer by Darkening the suitable circle with **Black/Blue Ball Pen** in the OMR answer sheet supplied to you separately.

1 **The steady state error of the control system with input r(t) and open loop transfer function G(s)H(s) is given by**

A $ess = \lim_{s->0} \frac{R(s)}{1+G(s)H(s)}$

B $ess = \lim_{s->0} \frac{sR(s)}{1+G(s)H(s)}$

C $ess = \lim_{s->0} \frac{s^2R(s)}{1+G(s)H(s)}$

D $ess = \lim_{s->0} \frac{s^3R(s)}{1+G(s)H(s)}$

2 **The open-loop transfer function of control system is given by** $G(s)H(s) = \frac{K}{s(s+3)(s+5)}$**. The angels of Asymptotes of root locus are given by**

A $60^0, 180^0, 300^0$

B $90^0, 180^0, 270^0$

C $30^0, 60^0, 90^0$

D $60^0, 120^0, 180^0$

3 **Nyquist Criteria for stability of control system is given by**

A N=P-Z

B Z=N-P

C P=N-Z

D N=P

4 **A system is represented by differential equation** $M\frac{d^2x}{dt^2} + F\frac{dx}{dt} + Kx = u(t)$ **The transfer function relating X(s) and u(s) is**

A $\frac{M}{Ms^2+Fs+K}$

B $\frac{F}{Ms^2+Fs+K}$

C $\frac{K}{Ms^2+Fs+K}$

D $\frac{1}{Ms^2+Fs+K}$

5 **At gain cross over frequency 150 rad/sec. G(jω)H(jω)= -200 degree the phase margin is given by**

A -200

B -180

C -20

D 150

6 **If Mp = 100 %, the damping ratio is**

A 1 C 0.5

B 0 D infinity

7 **The expression** $\nabla XE = -\frac{\partial B}{\partial t}$ **is for**

A Gauss Divergence Law C Faraday's Law

B Ampere's Law D None of these

8 **The VSWR of a transmission line having Characteristic Impedance 50 ohm and terminated by a resistance of 75 ohm is given by**

A 50 C 75

B 1.5 D 2.5

9 **The intrinsic impedance of lossy dielectric medium is given by**

A $\frac{j\omega\mu}{\sigma}$ C $\sqrt{\frac{j\omega\mu}{\sigma + j\omega\varepsilon}}$

B $\sqrt{\frac{\sigma + j\omega\varepsilon}{j\omega\mu}}$ D $\frac{j\omega\varepsilon}{\mu}$

10 **Cut off frequency for dominating mode in rectangular wave guide with dimensions 4 cm X 2cm is given by**

A 3GHz C 3.55 GHz

B 3.75 GHz D 3.45 GHz

11 **Minimum number of NAND gates required to implement the Boolean function** $A + A\bar{B} + A\bar{B}C$ **is equal to**

A 0 C 2

B 3 D 5

12 **How many FFs are required to build a binary counter circuit to count 0 to1023?**

A 1023 C 0

B 1024 D 10

13 **For the given logic families ,correct order of their increasing noise margin is**

A RTL , ECL , MOS , DTL

C ECL , RTL , MOS , DTL

B RTL , ECL , DTL , MOS

D ECL , RTL , DTL , MOS

14 **The full scale output of a 10-bit DAC is 5 V. The resolution is**

A 5 mV

C 2.5 mV

B 10 mV

D 20 mV

15 **The address bus width of a memory of size 1024 X 8 bits is**

A 10 bits

C 8 bits

B 13 bits

D 18 bits

16 **The distinct Eigen's values of the Matrix** $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$ **are**

A 0 and 1

C 1 and 2

B 1 and -1

D 0 and 2

17 **If x, y and z are positive real numbers , they the minimum value of** $x^2 + 8y^2 + 27z^2$ **where** $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 1$ **is**

A 108

C 405

B 216

D 1048

18 **Let y be the solution of the initial value problem** $\frac{dy}{dx} = y^2 + x \quad ; \quad y(0) = 1$

Using Taylor Series of order 2 with the step size h = 0.1 the approximate value of y(0.1) is

A 1.315

C 1.115

B 1.415

D 1.215

19 **While solving the equation** $x^2 - 3x + 1 = 0$ **using the Newton –Raphson method with the initial guess of a root as 1 ,the value of the root after one iteration is**

A 1.5

C 0.5

B 1

D 0

20 **Let I =** $\oint_c (2x^2 + y^2)dx + e^y dy$ **, where c is the boundary (oriented anti -clock**

wise) of the region in the first quadrant by y=0, $x^2 + y^2 = 1$ and x = 0 , The value of I is

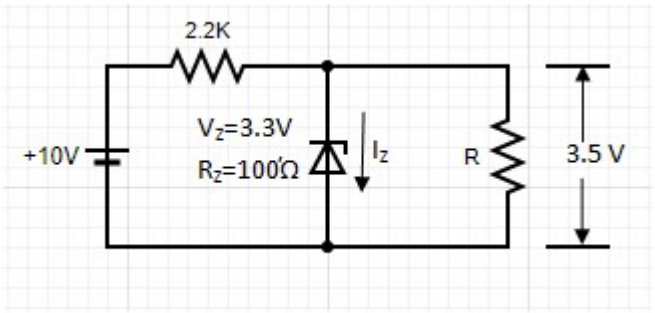
A -1

C $\frac{2}{3}$

B $-\frac{2}{3}$

D 1

21 **The current through the zener diode in the given circuit is**



A 33 mA

C 3.3 mA

B 2 mA

D 0 mA

22 **The Boolean Expression $Y = (A + B)(\bar{A} + C)$ is equal to**

A $AC + \bar{A}B$

C $\bar{A}B + BC + A\bar{B}C$

B $AC + \bar{A}B + BC$

D *Above all*

23 **When transistors are used in digital circuits they usually operate in the**

A Breakdown region

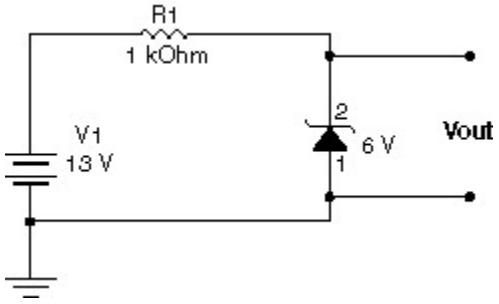
C. Active region

B Linear region

D Saturation and cut-off regions

24

What is the current through the zener diode?



A 0 mA

C. 8.3 mA

B 7 mA D 13 MA

25 **Which of the following improvements is (are) a result of the negative feedback in a circuit?**

A Lower output impedance C More linear operation

B Reduced noise D All of the above

26 **An op-amp has an open-loop gain of 75,000 and a cutoff frequency of 100 Hz. At 1 kHz the open-loop gain is given by**

A 10dB C 20 dB

B 6dB D 3 dB

27 **Inverse Fourier transform is given by**

A $x(t) = \frac{1}{\pi}\int_{-\infty}^{+\infty} X(\omega)e^{j\omega t}d\omega$ C $x(t) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} X(\omega)e^{j\omega t}d\omega$

B $x(t) = \frac{1}{\pi}\int_{-\infty}^{+\infty} X(\omega)e^{j\omega t}dt$ D $x(t) = \frac{1}{2\pi}\int_{-\infty}^{+\infty} X(\omega)e^{j\omega t}dt$

28 **Y(t)=10x(t)+5 is**

A A linear system C Time Invariant System

B Dynamic system D Non linear system

29 **The Nyquist rate for a signal** $x(t) = 5\cos(1000\pi)t$

A 2000Hz C 1000Hz

B 1200Hz D 5000Hz

30 **If C is capacity of noisy channel, (bits/s), δf is bandwidth Hz and S/N is signal to noise ratio, then**

A $C = (\delta f)\log_2\left(1 + \frac{S}{N}\right)$ C $C = \log_2\left(1 + \frac{S}{N}\right)$

B $C = 2(\delta f)\log_2\left(1 + \frac{S}{N}\right)$ D $C = (\delta f)\log_{10}\left(1 + \frac{S}{N}\right)$

31 **White Gaussian noise is passed through a linear narrow band filter. The probability density function of the envelope of the noise at the filter output is**

A Uniform C Gaussian

B Poisson D Rayleigh

32 **A memory less source emits n symbols each with a probability p. The entropy of the source as a function of n**

A increases

C increases as n

B decreases as log n

D increases as n log n

33 **An audio signal (say from 50 Hz to 10000 Hz) is frequency translated by a carrier having a frequency of 106 Hz. The values of initial (without frequency translation) and final (after frequency translation) fractional change in frequency from one band edge to the other are**

A 200 and 1.01

C 200 and 100.1

B 200 and 10.01

D 200 and 200

34 **The local oscillator of a broadcast receiver is tuned to a frequency higher than the incoming frequency**

A To help the image frequency rejection

C Because otherwise an intermediate frequency could not be produced

B To permit easier tracking

D To all adequate frequency coverage without switching

35 **In maximum transfer theorem when maximum power transfer taking place then the value of efficiency becomes**

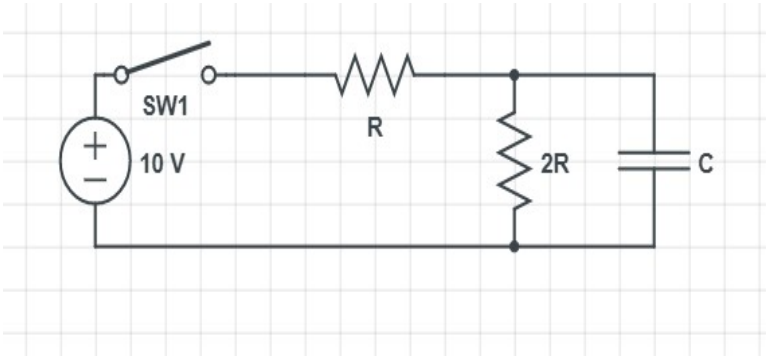
A 50%

C infinite

B 100%

D zero

36 **The time constant of network shown in Fig. is**



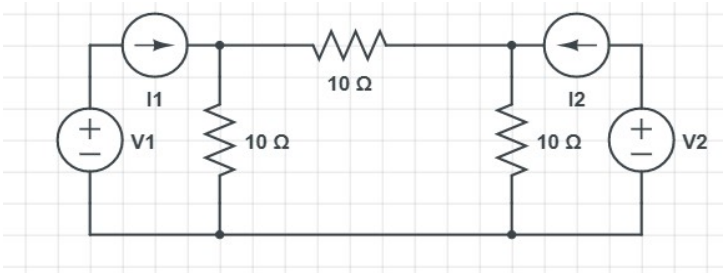
A 2RC

C RC/2

B 3RC

D 2RC/3

37 **For two port network shown in fig. the admittance matrix is**



A $\begin{bmatrix} 0.2 & -0.1 \\ -0.1 & 0.2 \end{bmatrix}$

B $\begin{bmatrix} -0.2 & 0.1 \\ 0.1 & -0.2 \end{bmatrix}$

C $\begin{bmatrix} 0.1 & 0.2 \\ 0.2 & 0.1 \end{bmatrix}$

D $\begin{bmatrix} 0.1 & -0.2 \\ -0.2 & 0.1 \end{bmatrix}$

38 **As the temperature is increased, the voltage across a diode carrying a constant current**

A Increases

B Decreases

C Remains Constant

D None of these

39 **The period of the signal** $x(t) = 8\sin(0.8\pi t + \frac{\pi}{4})$ **is**

A 0.4π s

B 0.8π s

C 1.25s

D 2.5s

The open loop transfer function of a feedback control system is given below:

G(s) H(s) = K/s(s+10) The value of gain factor K for critical damping is

40

A 10

B 15

C 20

D 25

ECE

Answer Keys

1	B	11	A	21	B	31	D
2	A	12	D	22	D	32	A
3	A	13	B	23	D	33	A
4	D	14	A	24	B	34	D
5	C	15	A	25	D	35	A
6	B	16	D	26	C	36	D
7	C	17	B	27	C	37	A
8	B	18	C	28	D	38	A
9	C	19	D	29	C	39	D
10	B	20	B	30	A	40	D