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SET-X

PHD-EE-2023-24

Electrical & Communication Engineering

	Sr. No
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	1. In the fabrica diffusion production	ation of monolithic IC cess. Find the diffusion	s, Boron chloride is time, if the furnance i	added as an impurity s heated upto 1200°C	in the
	(1) 01 hour	(2) 02 hours	(3) 35 minutes	(4) 20 minutes	
:	2. How the alum	ninium film coating is c	arried out in metalizat	ion process ?	
	(1) Heating a	nd Pouring aluminium	in required place	non process :	
		e aluminium in require		no it using tungsten	
	(3) Aluminium	m is vaccum evaporate	d and then condensed	ing it using tungsten	
	(4) None of the		e om stere pletig et page. Vive to dillekt veni faren kon		
3	. The burried lay	yer reduces collector se	eries resistance by pro	viding:	
	(1) A low resi	stivity current path fro	m n-type layer to n+ co	ontact layer	
	(2) A low resis	stivity current path from	m p-type layer to n ⁺ co	ontact layer	
	(3) A high resi	istivity current path fro	om n-type layer to n ⁺ o	contact layer	
		stivity current path from			
4.	The carrier den	sity in the channel in t	he constant voltage m	odel is scaled as:	
	(1) 1/β		(2) 1		
	(3) β	consumary or being	(4) All of the me	ntioned	
5.	The parameter v	which is <i>not</i> scaled to a	any factor is:		
	(1) Power speed	d product	(2) Switching end	ergy	
	(3) Channel res	istance	(4) All of the me	ntioned	
6.		IC operating at 15 M 10 MHz clock freque the IC is:			
	(1) 20 mW	(2) 40 mW	(3) 50 mW	(4) 90 mW	

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	. What should be the width of metal 1 ar	nd metal 2 layers?
7.		(3) 2λ , 4λ (4) 3λ , 4λ
	(1) 3λ , 3λ (2) 2λ , 3λ	
8.	are used in thick and	thin film ICs, as individual components from
	outside.	
	(1) Transistors	(2) Active elements
	(3) Diode	(4) All of the mentioned
9.	Growth of SiO_2 on Si substrate can be	be achieved in two ways either using oxygen of
	using water vapour for growing thicker	
	(1) dry oxidation can be used	(2) wet oxidations can be used
	(3) any of dry & wet can be used	(4) dry oxidation followed by wet oxidation
10.	stripping then the order in which the process is: (1) P-Q-R-S (2) Q-P-S-R	t is alignment & exposure and S is photoresisty are carried out in a standard photolithograph (3) P-S-R-Q (4) R-P-Q-S
11.	Which of the following options about	tunnel diodes is incorrect?
	(1) The width of depletion region is his	igh as compared to the p-n junction.
	(2) Impurity concentration is high as of	compared to p-n junction.
	(3) The V-I characteristics show the n	egative resistance region.
	(4) Carrier velocities are very high.	
12.	The following structures are used in H	igh Electron Mobility Transistor:
	(1) Diffusion & self aligned ion impla	
	(2) Recess gate structure	
	(3) Self aligned ion implented structur	re. & recess gate structure
	(4) Diffusion & recess gate structure	a recess gate structure
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	13. Preliminary filtration is one of the steps CNT. What is its purpose?	used in the liquid phase purification method of
	(1) To remove bulk solid particles	The state and as without the state of the st
	(3) To remove fullerences and catalysts	(2) To remove bulk graphite particles
1	4. By nano scale distribution of the performance.	in matrix improves the life and
	(1) Carbide (2) Hydrides	(3) Tungesten (4) Nitrides
1	5. Solar cell is made from bulk materials th	at is cut into water of thickness.
	(1) 120 190	(3) 180-220 μm (4) 180-240 μm
16	display system.	to light up are segment of a seven segment
	(1) 20 μm (2) 10 mW	(3) 10 nW (4) $02 \mu\text{W}$
17	An abrupt silicon pn-junction has dopa	ant concentration of Na = 2×10^{16} cm ⁻³ and
	$Nd = 2 \times 10^{-6}$ cm at $T = 300$ K. A rev	erse voltage of $V_R = 8 \text{ V}$ is applied to the pn-
	junction. What will be the maximum elec	어른 그 사람들이 보고 있다. 이 사람들은 그 사람들은 그 사람들은 사람들은 사람들이 되었다면 하는데 되었다.
	시민은 사람들은 아이들은 사람들은 사람들은 사람들이 되는 것이 되었다.	(2) $3.5 \times 10^4 \text{ V/cm}$
	(3) $7.0 \times 10^4 \text{ V/cm}$	(4) $6.45 \times 10^5 \text{ V/cm}$
18.	The impurity level in an extrinsic semice	nductor chant
10.		nductor about of pure semiconductor.
		(2) 1 atom for 108 atoms
		(4) 1 atom for 100 atoms
19.	When the temperature of an extrinsic	semiconductor is increased, the pronounced
	effect is on	
	(1) Minority carriers	(2) Majority carriers
	(3) Minority & Majority carriers	(4) Junction capacitance
20.		y of electrons in intrinsic semiconductors.
		(3) Less than (4) Cannot define
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- 21. Fermi level for intrinsic semiconductor lies:
 - (1) At middle of the band gap
- (2) Close to conduction band
- (3) Close to valence band

- (4) None
- 22. Consider the transistor shown in Fig. 1:

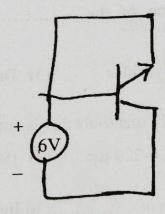


Fig. 1

The transistor is operating in:

- (1) Forward-Active region
- (2) Reverse-Active region

(3) Saturation region

- (4) Cut off region
- 23. The electron concentration in silicon decreases linearly from 10¹⁶ cm⁻³ to 10¹⁵ cm⁻³ over a distance of 0.10 cm. The cross-sectional area of sample is 0.05 cm². The electron diffusion coefficient, D_n is given by 25 cm²/sec. The diffusion current in silicon will be:
 - (1) 0.36 mA
- (2) 3.6 mA
- (3) 0.18 mA
- (4) 18 mA
- 24. A silicon p⁺n junction has doping concentration of $N_a = 10^{18}$ cm⁻³ and $N_d = 5 \times 10^{15}$ cm⁻³. The cross-sectional area of the junction is $A = 5 \times 10^{-5}$ cm², what will be the capacitance for the applied reverse voltage, $V_R = 3 \text{ V}$?
 - (1) 0.521 pF
- (2) 0.005 nF
- (3) 1.04 nF
- (4) 2.61 nF
- 25. Consider on MOS structure with p-type silicon and $N_a = 6 \times 10^{15}$ cm⁻³. If the gate is aluminium then the metal semiconductor work function difference, ϕ_{ms} of the MOS structure will be:
 - (1) -2.256 V
- (2) -0.944 V
- (3) 7.344 V
- (4) 4.144 V

- The phenomenon known as "Early Effect" in a bipolar transistor refers to a reduction of base-width caused by:
 - (1) Electron-hole recombination base
 - (2) The forward biasing of emitter-base junction
 - (3) The early removal of stored base charge during saturation to cut-off region
 - (4) The reverse biasing of base-collector junction
- The common short circuit current gain β of a transistor :
 - (1) is a monotonically increasing function of collector current I_C
 - (2) is a monotonically decreasing function I_C
 - (3) increasing with I_C , for low I_C reaches a maximum and then decrease with further increase in I_C
 - (4) is not a function of I_C
- The built-in-potential (diffusion potential) in a pn-junction: 28.
 - (i) increases with increase in temperature
 - (ii) increases with increase in doping in the dioping levels of two sides
 - (iii) is equal to the average of the Fermi levels of two sides
 - (iv) is equal to the difference of the Fermi levels of two sides

Which of the following statement is *correct*?

- (1) (i), (ii) & (iv) (2) (i) & (ii)
- (3) (ii) & (iii) (4) (i) & (iv)
- The current gain of the transistor as shown in Fig. 2 is $\beta = 125$. The Q-point values 29. $(I_{CO} \& V_{CEO})$ are:

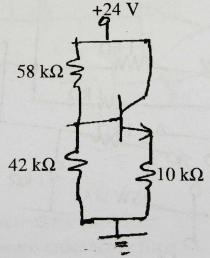


Fig. 2

(1) 0.418 mA & 20.4 V

(2) 0.913 mA & 16.23 V

(3) 0.913 mA & 14.8 V

(4) 0.418 mA & 18.43 mV

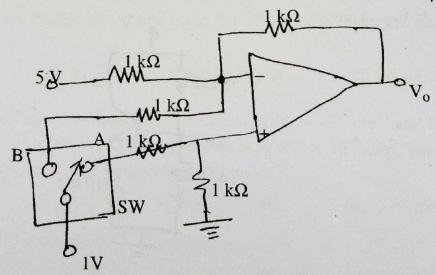
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- 30. The collector to emitter cut-off current (I_{CEO}) to base cut-off current (I_{CBO}) is as α is the CB current gain of transistor:
 - (1) $I_{CEO} = I_{CBO}$

(2) $I_{CEO} = \alpha I_{CBO}$

 $(3) I_{CEO} = \frac{I_{CBO}}{1+\alpha}$

- $(4) I_{CEO} = \frac{I_{CBO}}{1 \alpha}$
- 31. In a MOSFET the threshold voltage can be lowered by:
 - (1) increasing the gate oxide thickness
 - (2) reducing the substrate concentration
 - (3) increasing the substrate concentration
 - (4) using the dielectric of lower constant
- 32. The disadvantage of capacitor input LC filter in rectifier is:
 - (1) high cost, more weight and external field produced by series inductor
 - (2) high cost, moderate weight and no external field produced by series inductor
 - (3) high cost, less weight
 - (4) low cost, more weight
- 33. Which of the following architecture can be designed as an instrumentation amplifier?
 - (1) Indirect current feedback
- (2) Direct current feedback
- (3) Indirect voltage feedback
- (4) Direct voltage feedback
- 34. The circuit as shown in Fig. 3, $V_O = V_{OA}$ for switch SW in position A and $V_O = V_{OB}$ for switch SW in position B. Assume that op amp is ideal. The value of $\frac{V_{OB}}{V_{OA}}$ is:



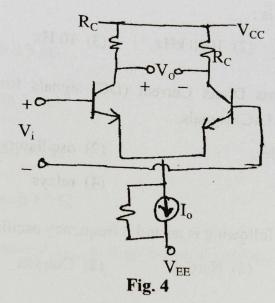
(1) 3

(2) 0.5

Fig. 3 (3) 2

(4) 1.5

In the differential amplifier as shown in Fig. 4, the magnitude of the common-mode and differential-mode gains are A_{cm} and A_d , respectively. If the resistance R_E is



- (1) A_{cm} increases
- (2) A_d increases
- (3) Common-mode rejection ratio increases
- (4) Common-mode rejection ratio decreases

Consider the following statements regarding the circuit as shown in Fig. 5

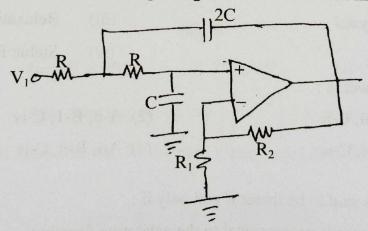


Fig. 5

- (i) The circuit represents an active low pass filter.
- (ii) The circuit represents a second order active filter.
- (iii) The circuit has a cut-off rate of 40 dB has decade.
- (1) (i), (ii) & (iii) are correct
- (2) (i) & (ii) are correct

(3) Only (i) is correct

(4) (ii) & (iii) are correct

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37.	An op-amp has open loop gain of 10 ⁵ this op-amp is connected as an amplif	and an open loop are with a closed g	cut-off frequency of 10 Hz. It ain of 100, then the new upper
	cut-off frequency is:		
	(1) 100 kHz (2) 1000 kHz	(3) 10 Hz	(4) 10 kHz
38.	converts Direct Current	(DC) signals fro	m the power supply units to
	Alternate Current (AC) signals.	*11 *	
	(1) micro controllers	(2) oscillators	
	(3) transformers	(4) relays	
39.	Which one of the following is an aud	lio frequency oscill	ator?
	(1) Wein bridge (2) Hartlay	(3) Colpitts	(4) Crystal
40.	Match the following:		A 11) is a second of the secon
	Group-I		Group-II
	(A) Hartlay	(i) I	Low frequency oscillator
	(B) Wein-Bridge	(ii)	High frequency oscillator
	(C) Crystal	(iii)	Relaxation oscillator
		(iv)	Stable frequency oscillator
	Correct answer is:		
	(1) A-i, B-iii, C-ii	(2) A-ii, B-1	, C-iv
	(3) A-iv, B-i, C-ii	(4) A-i, B-ii	, C-iv
41.	A network is said to be linear if and	only if:	
	(1) the response is proportional to t	he excitation func	tion
	(2) the principle of superposition a	pplies	
	(3) the principle of homogeneity ap		
	(4) both (2) and (3)		

- A battery charger can drive a current of 5 A into 1 Ω resistance connected at its output terminals. If it is able to charge an ideal 2 V battery at 7 A rate, then its Thevenin's equivalent will be:
 - (1) 7.5 V in series with 0.5 Ω
 - (2) 12.5 V in series with 1.5 Ω
 - (3) 7.5 V in parallel with 0.5 Ω
 - (4) 1.25 V in parallel with 1.5 Ω
- In a given circuit as shown in Fig. 6, if the power dissipated in 6 Ω resistor is zero, the Vis:

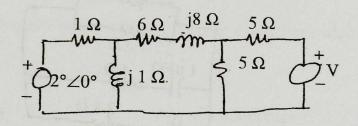


Fig. 6

- (1) $20\sqrt{2} \angle 45^{\circ}$ (2) $20 \angle 30^{\circ}$
- (3) $20 \angle 45^{\circ}$ (4) $20\sqrt{2} \angle 30^{\circ}$
- 44. Y parameters of a four terminal block are $\begin{bmatrix} 4 & 2 \\ 1 & 1 \end{bmatrix}$. A single element of 1 Ω is connected acoss as shown in Fig. 7. The new Y-parametes will be:

$$(1)\begin{bmatrix} 4 & 3 \\ 2 & 2 \end{bmatrix}$$

(1)
$$\begin{bmatrix} 4 & 3 \\ 2 & 2 \end{bmatrix}$$
 (2)
$$\begin{bmatrix} 4 & 2 \\ 1 & 1 \end{bmatrix}$$
 (3)
$$\begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$$
 (4)
$$\begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$$

Fig. 7
$$(3) \begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$$

$$(4) \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$$

In the given circuit as shown in Fig. 8, the switch was closed for a long time before opening at t = 0. The voltage v_x at $t = 0^+$ is:

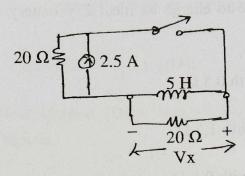


Fig. 8

- (1) 25 V
- (2) 50 V
- (3) -50 V
- (4) 0 V
- What is the steady state current in 2 Ω resistor as shown Fig. 9 ? Internal resistance of the battery is negligible and value of the capacitance C is 0.2 μF :

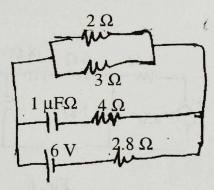


Fig. 9

- (1) 1.5 A
- (2) 1.2 A
- (3) 0.6 A
- (4) 0.9 A

- Fourier Transform of $-a^n u(-n-1)$ is: 47.
- (1) $\frac{1}{1+ja\omega}$ (2) $\frac{1}{1-ja\omega}$ (3) $\frac{1}{1+ae^{-j\omega}}$ (4) $\frac{1}{1-ae^{j\omega}}$
- The number of complex multiplications and complex additions involved in the direct 48. computation of δ-point DFT:
 - (1) 64 & 56
- (2) 8 & 16
- (3) 64 & 64
- (4) 64 & 8

- 49. Non-linearity in the relationship between Ω and ω is known as :
 - (1) aliasing

(2) frequency warping

(3) unwarping

- (4) frequency mixing
- 50. For rectangular window, the peak side lobe magnitude in dB is:
 - (1) -58 dB
- (2) -41 dB
- (3) -31 dB
- (4) 13 dB
- 51. The abrupt truncation of Fourier series results in oscillations in:
 - (1) both pass band & stop band
- (2) only pass band

(3) only stop band

- (4) none of these
- **52.** The trigonometric Fourier series representation of a function with half wave symmetry consists of :
 - (1) even hormonics

(2) old hormonics

(3) sine terms only

- (4) cosine terms only
- **53.** The circuit as shown in Fig. 10 converts a binary code Y_1 Y_2 Y_3 into :

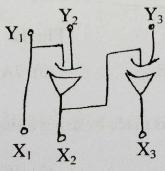


Fig. 10

(1) Hamming code

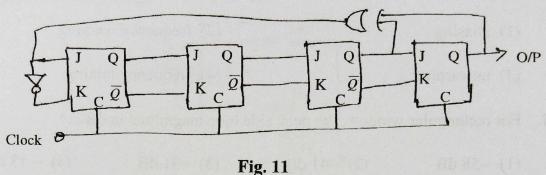
(2) BCD code

(3) Gray code

(4) Excess 3-code

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The circuit in Fig. 11 produces the output sequence: 54.



(1) 1111	1111	0000	0000
(2) 1111	0000	1111	0000
(3) 1111	0001	0011	0100
(4) 1010	1010	1010	1010

If initially register contains byte B7H, then after 04 clock pulses, the contents of 55. register will be shown in Fig. 12:

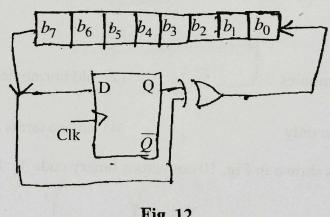


Fig. 12

(1) 7C

(2) 7E

(3) 7A

(4) 74

A switch-tail ring counter is made by using a single D-FF. The resulting circuit is: 56.

(1) SR Flip-flop

(2) JK Flip-flop

(3) D-FF

(4) T-FF

A			1	13
57.	(1) a seriel-in-serial abia			
58.	 Dual slope integration type analog to digit (1) higher speeds compared to all other ty (2) poor rejection of power supply hum (3) better resolution compared to all onumber of bits 	ypes of A/D convete	ers	e
59.	will be:	ter, the resister val	ue corresponding to MS	В
60.		(3) $16 \text{ k}\Omega$ Tresolution uses a cligital output for V_A (3) 10010111	 (4) 32 kΩ lock frequency of 2.5 MI = 6.000 V is: (4) 10010110 	łz
61.	inserted between by	the READY input (2) $T_2 \& T_3$ disab (4) $T_3 \& T_4$ enable	oling ling	ure
62.	 AL, AX and DX registers of 8086 are used (1) Multiply, Divide, I/O and Translate (2) Multiply, Divide, I/O and Decimal at (3) Multiply, Divide, I/O, Translate and 	djustments		

(4) Multiply, Divide and I/O

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63.	If $[BX] = 1234 \text{ H}$, $[BP] = 2490 \text{ H}$, $AX = 1000 \text{ H}$, $LIST = 5980 \text{ H}$, $CS = 3000 \text{ H}$,
	DS = 2000 H, ES = 5000 H and SS = 6000 H. The effective and physical address of
	MOV LIST [BP], AX is given by:

- (1) 8E10, 28E10
- (2) 8E10, 68E10
- (3) 7E10, 27E10
- (4) 7E10, 67E10
- 64. If CF = 1, AX = 1F89H, what are the contents of AX and CF after the execution of following instructions?

MOV CL, 2

RCL AX, CL

- (1) AX = 2A6BH & CF = 1
- (2) AX = 7EA6H & CF = 0
- (3) AX = 7FB7H & CF = 0
- (4) AX = 0F89H & CF = 1
- **65.** Why is CHMOS technology preferred over HMOS technology for designing devices of MCS-51 family?
 - (1) Due to higher noise immunity
 - (2) Due to lower power consumption
 - (3) Due to higher speed
 - (4) All of the above
- 66. Which is the only register without internal on-chip RAM address in MCS-51?
 - (1) Stack pointer

(2) Program counter

(3) Data printer

- (4) Timer register
- 67. Which among the below mentioned functions does *not* belong to the category of alternate functions performed by Port-3 (Pins 10-17)?
 - (1) Read/write control signals
- (2) Serial ports

(3) Internal interrupts

(4) External interrupts

A			
6	for overall instruction sent? (1) 45 single byte, 45 two bytes and 1 (2) 45 single byte, 45 two bytes and 1 (3) 55 single byte, 40 two bytes and 2 (4) 40 single byte, 55 two bytes and 1	7 three bytes 5 three bytes 0 three bytes 7 three bytes	
69.	Which rotate instructions has an ability respectively to accumulator?	y to modify CY flag b	by moving the bit-7 & bit-0
70.	(1) RR & RL (2) RRC & RLC Which instructions affect the program ((1) CALL & RETURN		(4) RL & RLC
	(3) PUSH & POP	(2) RETURN & JUMF	
71.	Which one of the following sets of equal (1) Two curl equations		of Maxwell's equations?
	(2) Two divergence equations		
•	(3) Both curl and divergence equations		
((4) Two curl equations combined with c	continuity equation	
	The lowest frequency at which a unifor boundary at $z = 0$ will have no reflection		nt from region 1 onto the
(1	1) 45° (2) 30°	(3) 90°	(4) 60°

73. A receiving antenna is located 100 m away from the transmitting antenna. If the effective area of the receiving antenna is 500 cm² and the power density at the receiving location is 2 mW/m², the total power received is:

(1) $10 \mu W$

(2) 100 nW

(3) 100 μW

(4) 10 nW

- 74. Which of these is not true of a lossless line?
 - (1) $Z_{in} = -j Z_0$ for a shorted line with $1 = \lambda/8$
 - (2) $Z_{in} = Z_0$ for a mached line
 - (3) $Z_{in} = j \infty$ for a shorted line with $1 = \lambda/4$
 - (4) All of the above
- 75. Which of the following potentials does not satisfy Laplace's equation?
 - (1) V = 2x + 5

(2) $V = \rho \cos \phi + 10$

(3) $V = r \cos \phi$

- (4) $V = \frac{10}{10}$
- 76. By saying that the electrostatic field is conservative, we do not mean that:
 - (1) It is the gradient of a scalar potential
 - (2) Its circulation is identically zero
 - (3) Its curl is identically zero
 - (4) The potential difference between any point is zero
- 77. A zero mean white Gaussian noise is passed through an ideal low pass filter of bandwidth 10 kHz. The output of the samples so obtained would be:
 - (1) Correlated

(2) Statistically independent

(3) Incorrelated

- (4) Orthogonal
- **78.** If in a broadcasting studio, a 1000 kHz carrier is modulated by an audio signal of frequency range 100-5000 kHz, the width of channel is:
 - (1) 5 kHz
- (2) 4.9 kHz
- (3) 995 kHz
- (4) 10 kHz

79.	The bit rate of	the digital			17
	16 QAM. The n	ninimum bandwidth re (2) M/16 kHz	ation system is MI	KBPS. The modulation used	
	(1) M/2 kHz	(2) November 1	quired for ideal tra	insmission is :	15
		TO KITZ	(3) MHz	(4) M/8 kH ₂	
80.	The noise perform	rmance of a square low	v demodulator of		
	(1) better than t	hat of an envelope det	ector	NM signal is:	
	(2) better than t	hat of a synchronous d			
	(3) identical tha	n that of a synchronou	is detector		
	(4) poorer than	that of envelope detec	tor		
81.	If carrier modulates 180° and 270°, the	ated by a digital bit s hen the modulation is	tream has one of called:	the possible phases of 0°,	90°,
	(1) BPSK	(2) QPSK	(3) QAM	(4) MSK	
(PCM with uniform que: antizing levels		ne interval (-V, +V) is to signal to quantization nois	
	3) dynamic rang				
(4	1) power spectru	ım of signal	nadaj ar bereki		
83. In	asynchronous '	TDM, for n signal so	ources, each fram	te contains m slots, where	m is
us	sually:				
(1) 2n		(2) greater tha	n 2 <i>n</i>	
(3	\		(4) less than n		
()) n				
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84.	An optical fiber behaves as a birefringence	ce medium due to differences in:
	(1) Effective R-I and core geometry	
	(2) Core-cladding symmetry	
	(3) Transmission/propagation time of wa	ves
	(4) Refractive indices of glass & silica	
85.	5. A single node fiber has mode field diam diameter of this fiber ?	neter 10.2 μ m and V = 2.20. What is the core
	(1) 11.1 μm (2) 13.2 μm	(3) 7.6 μm (4) 10.1 μm
86.		arce of RMS spectral width of 60 nm and m ⁻¹ km ⁻¹ . Estimate rms pulse broadening due
	(1) 12.5 ns km^{-1} (2) 9.6 ns km^{-1}	(3) 9.0 ns km^{-1} (4) 10.2 ns km^{-1}
87.	A compared to planar LED structure, efficiency effective emission area	Dome LEDs have external power and radiance.
	(1) greater, lesser, reduced	(2) higher, greater, reduced
	(3) higher, lesser, increased	(4) greater, greater, increased
88.	. The wavelength of RAPD with 70% effi	ciency and responsibility 0.689 A/W is given
	(1) $06 \mu \text{m}$ (2) $7.21 \mu \text{m}$	(3) 0.112 μm (4) 03 μm
89.	An RC Snubber circuit is used to protect	a thysistor against :
	(1) 61	(2) failure to turn on
	(2)	(4) failure to commutate
90.	What is the backup duration for 600 VA	UPS ?
	(1) 30 to 45 minutes	(2) 15 to 20 minutes
	(3) 01 to 05 minutes	(4) 05 to 10 minutes
PHD-E	EE-2023-24/(Elect. & Comm. Engg.)(SE	F- Y)/(A)

d

Which of the following is *not* a characteristic of an ideal transducer?

(2) high repeatability

(3) high dynamic range (4) low linearity

The characteristics of transducer refer to the performance of the transducer when it is subject to time varying signal.

(1) Dynamic

(2) Static

(3) Transiant (4) Both (1) and (2)

19

93. High Q coils inductance can be precisely measured by:

(1) Maxwells inductance bridge

(2) Hay's bridge

(3) Schering bridge

(4) Anderson's bridge

The device which is used for making temporary measurements of flow is:

(1) Venturi

(2) Dull flow tube

(3) Orfice plate

(4) Pitot static tube

The response c(t) of a system is described by the differential equation 95. $\frac{d^2}{dt^2}c(t) + 4\frac{d}{dt}c(t) + 5c(t) = 0.$ The system response is:

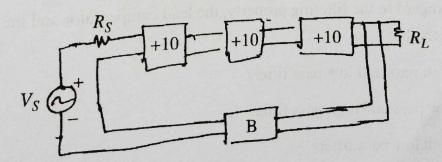
(1) Undamped

(2) Under damped

(3) Critically damped

(4) Oscillatory

96. Consider the following amplifier with -ive feedback:



If the closed loop gain of the above amplifier is +100, the value of B will be:

 $(2) +11 \times 10^3$

 $(1) -11 \times 10^3$

 $(4) +9 \times 10^3$

- 97. A system has open loop transfer function $G(s) = \frac{10}{s(s+1)(s+3)}$, what is the steady state error when it is subjected to the input $r(t) = 10 + 2t + 3/2^{t^2}$?
 - (1) 0.4
- (2) 4
- (3) infinity
- (4) none of these
- **98.** The given characteristics polynomial $s^4 + s^3 + 2s^2 + 2s + 3 = 0$ has :
 - (1) zero root in RHS in s-plane
- (2) one root in RHS of s-plane
- (3) two roots in RHS of s-plane
- (4) three roots in RHS of s-plane
- 99. Consider the following statements:

In root-locus plot, the breakaway points

- (a) need not always be on real axis alone
- (b) must lie on root loci
- (c) must lie on 0 and 1

Which of these statements are correct?

(1) (a) and (b)

(2) (b) and (c)

(3) (a) and (c)

- (4) (a), (b) and (c)
- **100.** With regard to the filtering property, the lead compensator and the lag compensator are respectively:
 - (1) high pass and low pass filters
 - (2) low pass and high pass filters
 - (3) both low pass filters
 - (4) both high pass filters

Total No. of Printed Pages: 21

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PHD-EE-2023-24

SET-X

Electrical & Communication Engineering

10002

Time: 11/4 Hours Roll No. (in figures)	Max. Marks : 100 (in words)	Total Questions : 100
Name	Date of Birth	
Father's Name	Mother's Name	
Date of Examination		
(Signature of the Candidate)		(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates *must return* the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
- 5. The candidate *must not* do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers *must not* be ticked in the question booklet.
- 6. There will be no negative marking. Each correct answer will be awarded one full mark. Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated as incorrect answer.
- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

- 1. A network is said to be linear if and only if:
 - (1) the response is proportional to the excitation function
 - (2) the principle of superposition applies
 - (3) the principle of homogeneity applies
 - (4) both (2) and (3)
- 2. A battery charger can drive a current of 5 A into 1 Ω resistance connected at its output terminals. If it is able to charge an ideal 2 V battery at 7 A rate, then its Thevenin's equivalent will be:
 - (1) 7.5 V in series with 0.5 Ω
- (2) 12.5 V in series with 1.5 Ω
- (3) 7.5 V in parallel with 0.5 Ω
- (4) 1.25 V in parallel with 1.5 Ω
- 3. In a given circuit as shown in Fig. 6, if the power dissipated in 6 Ω resistor is zero, the Vis:

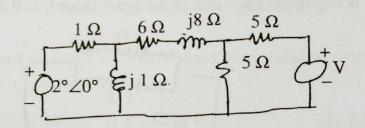


Fig. 6

(1)
$$20\sqrt{2} \angle 45^{\circ}$$

(3)
$$20 \angle 45^{\circ}$$
 (4) $20\sqrt{2} \angle 30^{\circ}$

Y parameters of a four terminal block are $\begin{bmatrix} 4 & 2 \\ 1 & 1 \end{bmatrix}$. A single element of 1 Ω is connected acoss as shown in Fig. 7. The new Y-parametes will be:

$$\begin{array}{c|c}
1 & 2 \\
1 & 1
\end{array}$$

Fig. 7

$$(1)\begin{bmatrix}4&3\\2&2\end{bmatrix}$$

$$(2)\begin{bmatrix} 4 & 2 \\ 1 & 1 \end{bmatrix}$$

$$(3) \begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$$

$$(4) \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$$

B

5. In the given circuit as shown in Fig. 8, the switch was closed for a long time before opening at t = 0. The voltage v_x at $t = 0^+$ is:

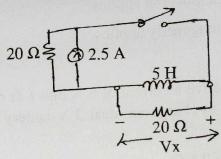


Fig. 8

- (1) 25 V
- (2) 50 V
- (3) -50 V
- (4) 0 V
- What is the steady state current in 2 Ω resistor as shown Fig. 9 ? Internal resistance of the battery is negligible and value of the capacitance C is $0.2\,\mu F$:

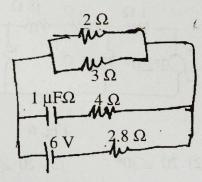


Fig. 9

- (1) 1.5 A
- (2) 1.2 A
- (3) 0.6 A
- (4) 0.9 A

- 7. Fourier Transform of $-a^n u(-n-1)$ is:
 - $(1) \frac{1}{1+ja\omega}$
- (2) $\frac{1}{1-ja\omega}$ (3) $\frac{1}{1+ae^{-j\omega}}$ (4) $\frac{1}{1-ae^{j\omega}}$
- The number of complex multiplications and complex additions involved in the direct computation of δ-point DFT:
 - (1) 64 & 56
- (2) 8 & 16
- (3) 64 & 64
- (4) 64 & 8

14

	(1) aliasing		(2)	frequency warping	
	(3) unwarping		(4)	frequency mixing	
10	. For rectangular w	indow, the peak si	ide lobe m	nagnitude in dB is:	
	(1) -58 dB	(2) -41 dB	(3)	-31 dB (4) $-13 dB$	
11.	(1) Two curl equal(2) Two divergen	ations ce equations	id Sus and	is independent of Maxwell's equation	ons?
	(3) Both curl and(4) Two curl equal			nuity equation	
12.	The lowest freque boundary at $z = 0$			ane wave incident from region 1 o	nto the
	(1) 45°	(2) 30°	(3)	90° (4) 60°	
3.	A receiving anten effective area of receiving location i (1) 10 μW	the receiving and $s 2 \text{ mW/m}^2$, the	tenna is	ty from the transmitting antenna. 500 cm ² and the power density er received is: 100 μW (4) 10 nW	If the at the
۱.	Which of these is n	ot true of a lossle	ss line?	CHAIGE TO THE SHAPE (I)	
	$(1) Z_{in} = -j Z_0 \text{ for}$	a shorted line wi	th $l = \lambda/8$	cupa a su cantingolizza cere adli.	
	$(2) Z_{in} = Z_0 \text{ for a}$	mached line			

9. Non-linearity in the relationship between Ω and ω is known as :

(4) All of the above

(3) $Z_{in} = j \infty$ for a shorted line with $l = \lambda/4$

B

(1) V = 2x + 5

(2) $V = \rho \cos \phi + 10$

(3) $V = r \cos \phi$

(4) $V = \frac{10}{r}$

16. By saying that the electrostatic field is conservative, we do not mean that:

- (1) It is the gradient of a scalar potential
 - (2) Its circulation is identically zero
 - (3) Its curl is identically zero
 - (4) The potential difference between any point is zero

A zero mean white Gaussian noise is passed through an ideal low pass filter of 17. bandwidth 10 kHz. The output of the samples so obtained would be:

(1) Correlated

(2) Statistically independent

(3) Incorrelated

(4) Orthogonal

18. If in a broadcasting studio, a 1000 kHz carrier is modulated by an audio signal of frequency range 100-5000 kHz, the width of channel is:

- (1) 5 kHz
- (2) 4.9 kHz
- (3) 995 kHz
- (4) 10 kHz

The bit rate of the digital communication system is MKBPS. The modulation used is 19. 16 QAM. The minimum bandwidth required for ideal transmission is :

- (1) M/2 kHz
- (2) M/16 kHz
- (3) MHz
- (4) M/8 kHz

The noise performance of a square low demodulator of AM signal is: 20.

- (1) better than that of an envelope detector
- (2) better than that of a synchronous detector
- (3) identical than that of a synchronous detector
- (4) poorer than that of envelope detector

B

- 21. Which of the following is *not* a characteristic of an ideal transducer?
 - (1) low noise

(2) high repeatability

(3) high dynamic range

- (4) low linearity
- 22. The characteristics of transducer refer to the performance of the transducer when it is subject to time varying signal.
 - (1) Dynamic
- (2) Static
- (3) Transiant
- (4) Both (1) and (2)
- 23. High Q coils inductance can be precisely measured by:
 - (1) Maxwells inductance bridge
- (2) Hay's bridge

(3) Schering bridge

- (4) Anderson's bridge
- 24. The device which is used for making temporary measurements of flow is:
 - (1) Venturi

(2) Dull flow tube

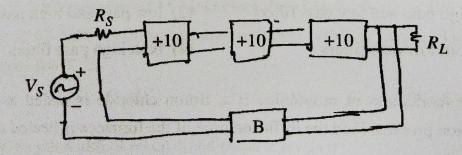
(3) Orfice plate

- (4) Pitot static tube
- **25.** The response c(t) of a system is described by the differential equation $\frac{d^2}{dt^2}c(t) + 4\frac{d}{dt}c(t) + 5c(t) = 0$. The system response is:
 - (1) Undamped

(2) Under damped

(3) Critically damped

- (4) Oscillatory
- 26. Consider the following amplifier with -ive feedback:



If the closed loop gain of the above amplifier is +100, the value of B will be:

$$(1) -11 \times 10^3$$

$$(2) + 11 \times 10^3$$

$$(3) -9 \times 10^3$$

$$(4) +9 \times 10^3$$

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A system has open loop transfer function $G(s) = \frac{10}{s(s+1)(s+3)}$, what is the steady 27.

state error when it is subjected to the input $r(t) = 10 + 2t + 3/2^{t^2}$?

- (1) 0.4
- (2) 4
- (3) infinity
- (4) none of these
- The given characteristics polynomial $s^4 + s^3 + 2s^2 + 2s + 3 = 0$ has: 28.
 - (1) zero root in RHS in s-plane
- (2) one root in RHS of s-plane
- (3) two roots in RHS of s-plane
- (4) three roots in RHS of s-plane
- Consider the following statements: 29.

In root-locus plot, the breakaway points

- (a) need not always be on real axis alone
- (b) must lie on root loci
- (c) must lie on 0 and 1

Which of these statements are correct?

(1) (a) and (b)

(2) (b) and (c)

(3) (a) and (c)

- (4) (a), (b) and (c)
- With regard to the filtering property, the lead compensator and the lag compensator are 30. respectively:
 - (1) high pass and low pass filters
- (2) low pass and high pass filters

(3) both low pass filters

- (4) both high pass filters
- In the fabrication of monolithic ICs, Boron chloride is added as an impurity in the diffusion process. Find the diffusion time, if the furnance is heated upto 1200°C.
 - (1) 01 hour
- (2) 02 hours
- (3) 35 minutes
- (4) 20 minutes

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	assume the above in its	m film coating is car	ried out in metalizati	on process.				
32.	How the aluminium film coating is carried out in metalization process? (1) Heating and Pouring aluminium in required place							
	(1) Heating and Pouring aluminium in required place and then heating it using tungsten (2) Placing the aluminium in required place and then heating it using tungsten							
	(2) Placing the aluminium in required place as							
	(3) Aluminium is vaccum evaporated and their condens							
	(4) None of the mentioned							
		- Jugas collector Se	ries resistance by pro	viding:				
33.	The burried layer reduces collector series resistance by providing:							
	(1) A low resistivity current path from n-type layer to n ⁺ contact layer							
	(2) A low resistivity current path from p-type layer to n ⁺ contact layer							
	(3) A high resisti	ivity current path fro	m n-type layer to n ⁺ o	contact layer				
	(4) A high resisti	vity current path from	m p-type layer to n+ c	ontact layer				
	The carrier density in the channel in the constant voltage model is scaled as:							
34.		ty in the channel in t		loger is scared as .				
	(1) 1/β			Tentanonogra off Sk				
	(3) β		(4) All of the me	entioned				
35.	The parameter w	hich is <i>not</i> scaled to	any factor is:					
	(1) Power speed	product	(2) Switching en	ergy				
	(3) Channel resi	stance	(4) All of the me	entioned				
36.	A digital CMOS	IC operating at 15 M	MHz clock frequency	consumes 130 mW, the same				
	IC operating at 10 MHz clock frequency consumes 100 mW power. The static power consumption of the IC is:							
	(1) 20 mW	(2) 40 mW	(3) 50 mW	(4) 90 mW				
37.	What should be	the width of metal 1	and metal 2 layers?					
	(1) 3λ, 3λ	(2) 2λ, 3λ	(3) 2λ, 4λ	(4) 3λ, 4λ				
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		36	//(D)	Р. Т. О				
energy and the second								

- 38. are used in thick and thin film ICs, as individual components from outside.
 - (1) Transistors

(2) Active elements

(3) Diode

(4) All of the mentioned

39. Growth of SiO_2 on Si substrate can be achieved in two ways either using oxygen or using water vapour for growing thicker oxides?

(1) dry oxidation can be used

(2) wet oxidations can be used

(3) any of dry & wet can be used

(4) dry oxidation followed by wet oxidation

40. If P is development, Q is etching, R is alignment & exposure and S is photoresist stripping then the order in which they are carried out in a standard photolithography process is:

(1) P-Q-R-S

- (2) Q-P-S-R
- (3) P-S-R-Q
- (4) R-P-Q-S
- 41. The abrupt truncation of Fourier series results in oscillations in:

(1) both pass band & stop band

(2) only pass band

(3) only stop band

(4) none of these

42. The trigonometric Fourier series representation of a function with half wave symmetry consists of :

(1) even hormonics

(2) old hormonics

(3) sine terms only

(4) cosine terms only

43. The circuit as shown in Fig. 10 converts a binary code Y_1 Y_2 Y_3 into :

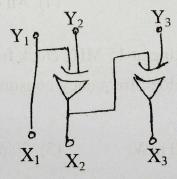


Fig. 10

(1) Hamming code

(2) BCD code

(3) Gray code

(4) Excess 3-code

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44. The circuit in Fig. 11 produces the output sequence:

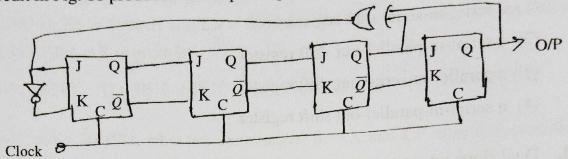


Fig. 11

(1)	1111	1111	0000	0000
(2)	1111	0000	1111	0000

0011

(4) 1010 1010 1010 1010

0001

45. If initially register contains byte B7H, then after 04 clock pulses, the contents of register will be shown in Fig. 12:

0100

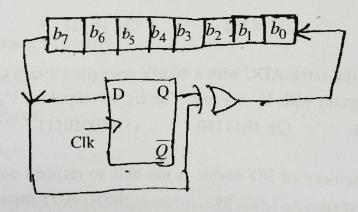


Fig. 12

(1) 7C

(3) 1111

(2) 7E

(3) 7A

(4) 74

46. A switch-tail ring counter is made by using a single D-FF. The resulting circuit is:

(1) SR Flip-flop

(2) JK Flip-flop

(3) D-FF

(4) T-FF

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0	
47.	A pulse train can be delayed by a finite number periods usings of clock:
	(1) a seriel-in-serial shift register
	(2) a serial-in-parallel-out shift register
	(3) a parallel-in-serial-out shift register
	(4) a serial-in-parallel-out shift register
48.	Dual slope integration type analog to digital converters provide: (1) higher speeds compared to all other types of A/D conveters
	(2) poor rejection of power supply hum
	(3) better resolution compared to all other types of A/D converters for the same number of bits
	(4) very good accuracy without putting extreme requirements on component stability
49.	In a 4-bit weighted resistor D/A converter, the resister value corresponding to MSB will be:
	(1) $4 k\Omega$ (2) $8 k\Omega$ (3) $16 k\Omega$ (4) $32 k\Omega$
50.	An 8-bit digital ramp ADC with a 40 mV resolution uses a clock frequency of 2.5 MHz and a comparator with $V_T = 1$ mV. The digital output for $V_A = 6.000$ V is :
	(1) 1011111 (2) 1011110 (3) 10010111 (4) 10010110
51.	When the memory or I/O device is not able to respond quickly, wait states (Tw) are inserted between by the READY input of the 8086.
	(1) $T_3 \& T_4$ disabling (2) $T_2 \& T_3$ disabling
	(3) $T_1 & T_2$ enabling (4) $T_3 & T_4$ enabling
52.	AL, AX and DX registers of 8086 are used in following instructions:
	(1) Multiply, Divide, I/O and Translate
	(2) Multiply, Divide, I/O and Decimal adjustments
	(3) Multiply, Divide, I/O, Translate and Decimal adjustments
	, Tailsiate and Decimal adjustments

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(4) Multiply, Divide and I/O

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- If [BX] = 1234 H, [BP] = 2490 H, AX = 1000 H, LIST = 5980 H, CS = 3000 H, DS = 2000 H, ES = 5000 H and SS = 6000 H. The effective and physical address of MOV LIST [BP], AX is given by:
 - (1) 8E10, 28E10
- (2) 8E10, 68E10
- (3) 7E10, 27E10
- (4) 7E10, 67E10
- If CF = 1, AX = 1F89H, what are the contents of AX and CF after the execution of 54. following instructions?

MOV CL, 2

RCL AX, CL

- (1) AX = 2A6BH & CF = 1
- (2) AX = 7EA6H & CF = 0
- (3) AX = 7FB7H & CF = 0
- (4) AX = 0F89H & CF = 1
- Why is CHMOS technology preferred over HMOS technology for designing devices of MCS-51 family?
 - (1) Due to higher noise immunity
 - (2) Due to lower power consumption
 - (3) Due to higher speed
 - (4) All of the above
- Which is the only register without internal on-chip RAM address in MCS-51? 56.
 - (1) Stack pointer

(2) Program counter

(3) Data printer

- (4) Timer register
- Which among the below mentioned functions does not belong to the category of 57. alternate functions performed by Port-3 (Pins 10-17)?
 - (1) Read/write control signals
- (2) Serial ports

(3) Internal interrupts

(4) External interrupts

- 58. How many single byte, two byte and three byte instructions are supported by MCS-51
- for overall instruction sent?
 - (1) 45 single byte, 45 two bytes and 17 three bytes
 - (2) 45 single byte, 45 two bytes and 15 three bytes
 - (3) 55 single byte, 40 two bytes and 20 three bytes
 - (4) 40 single byte, 55 two bytes and 17 three bytes
- Which rotate instructions has an ability to modify CY flag by moving the bit-7 & bit-0 59. respectively to accumulator?
 - (1) RR & RL
- (2) RRC & RLC
- (3) RR & RLC
- (4) RL & RLC
- Which instructions affect the program counter? 60.
 - (1) CALL & RETURN

(2) RETURN & JUMP

(3) PUSH & POP

- (4) CALL & JUMP
- Fermi level for intrinsic semiconductor lies: 61.
 - (1) At middle of the band gap
- (2) Close to conduction band
- (3) Close to valence band
- (4) None
- Consider the transistor shown in Fig. 1:

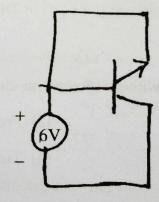


Fig. 1

The transistor is operating in:

- (1) Forward-Active region
- (2) Reverse-Active region

(3) Saturation region

(4) Cut off region

- The electron concentration in silicon decreases linearly from 10¹⁶ cm⁻³ to 10¹⁵ cm⁻³ over a distance of 0.10 cm. The cross-sectional area of sample is 0.05 cm². The 63. electron diffusion coefficient, D_n is given by 25 cm²/sec. The diffusion current in silicon will be:
 - (1) 0.36 mA
- (2) 3.6 mA
- (3) 0.18 mA
- (4) 18 mA
- A silicon p⁺n junction has doping concentration of $N_a = 10^{18}$ cm⁻³ and $N_d = 5 \times 10^{15}$ cm⁻³. The cross-sectional area of the junction is $A = 5 \times 10^{-5}$ cm², what will be the capacitance for the applied reverse voltage, $V_R = 3 \text{ V}$?
 - (1) 0.521 pF
- (2) 0.005 nF
- (3) 1.04 nF
- (4) 2.61 nF
- 65. Consider on MOS structure with p-type silicon and $N_a = 6 \times 10^{15}$ cm⁻³. If the gate is aluminium then the metal semiconductor work function difference, ϕ_{ms} of the MOS structure will be:
 - (1) -2.256 V

- (2) -0.944 V (3) 7.344 V (4) 4.144 V
- The phenomenon known as "Early Effect" in a bipolar transistor refers to a reduction of 66. base-width caused by:
 - (1) Electron-hole recombination base
 - (2) The forward biasing of emitter-base junction
 - (3) The early removal of stored base charge during saturation to cut-off region
 - (4) The reverse biasing of base-collector junction
- The common short circuit current gain β of a transistor : 67.
 - (1) is a monotonically increasing function of collector current I_C
 - (2) is a monotonically decreasing function I_C
 - (3) increasing with I_C , for low I_C reaches a maximum and then decrease with further increase in I_C
 - (4) is not a function of I_C
- The built-in-potential (diffusion potential) in a pn-junction:
 - (i) increases with increase in temperature
 - (ii) increases with increase in doping in the dioping levels of two sides
 - (iii) is equal to the average of the Fermi levels of two sides
 - (iv) is equal to the difference of the Fermi levels of two sides

Which of the following statement is correct?

- (1) (i), (ii) & (iv)
- (2) (i) & (ii)
- (3) (ii) & (iii)
- (4) (i) & (iv)

B

B

69. The current gain of $(I_{CQ} \& V_{CEQ})$ are:

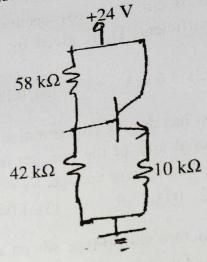


Fig. 2

- (1) 0.418 mA & 20.4 V
- (3) 0.913 mA & 14.8 V

- (2) 0.913 mA & 16.23 V
- (4) 0.418 mA & 18.43 mV
- 70. The collector to emitter cut-off current (I_{CEO}) to base cut-off current (I_{CBO}) is as α is the CB current gain of transistor:

(1)
$$I_{CEO} = I_{CBO}$$
 (2) $I_{CEO} = \alpha I_{CBO}$ (3) $I_{CEO} = \frac{I_{CBO}}{1+\alpha}$ (4) $I_{CEO} = \frac{I_{CBO}}{1-\alpha}$

- 71. Which of the following options about tunnel diodes is incorrect?
 - (1) The width of depletion region is high as compared to the p-n junction.
 - (2) Impurity concentration is high as compared to p-n junction.
 - (3) The V-I characteristics show the negative resistance region.
 - (4) Carrier velocities are very high.
- 72. The following structures are used in High Electron Mobility Transistor:
 - (1) Diffusion & self aligned ion implanted structure
 - (2) Recess gate structure
 - (3) Self aligned ion implented structure & recess gate structure
 - (4) Diffusion & recess gate structure

PHD

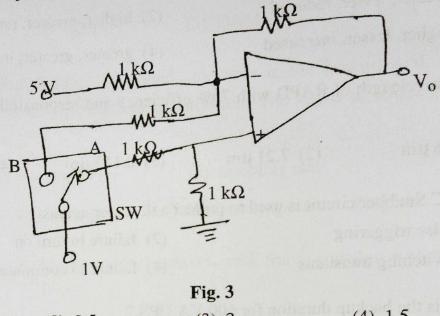
73.		n the liquid phase purification method of
	CNT. What is its purpose?	o remove bulk graphite particles
	(3) To remove fullerences and catalysts (4) T	o isolate w w Civi
74.	By nano scale distribution of the	in matrix improves the life and
	(1) Carbide (2) Hydrides (3) T	Yungesten (4) Nitrides
75.	5. Solar cell is made from bulk materials that is cu	ut into water of thickness.
	(1) 120-180 μm (2) 120-220 μm (3) 1	
76.	6. An LCD requires a power of to li	ight up are segment of a seven segment
	(1) $20 \mu\text{m}$ (2) 10mW (3) 1	0 nW (4) $02 \mu\text{W}$
77.	7. An abrupt silicon pn-junction has dopant con $Nd = 2 \times 10^{15} \text{ cm}^{-3}$ at $T = 300 \text{ K}$. A reverse v junction. What will be the maximum electric fi	voltage of $V_R = 8 \text{ V}$ is applied to the pn-
		$3.5 \times 10^4 \text{ V/cm}$
	[시간 사람들이 바다 마음 사람들이 얼마나 되었다.] 이 사람들이 되었다. 그리고 아니라	6.45×10^5 V/cm
78.	3. The impurity level in an extrinsic semiconduct	tor about of pure semiconductor.
70.	[18] [18] [18] [18] [18] [18] [18] [18]	1 atom for 108 atoms
		1 atom for 100 atoms
79.	9. When the temperature of an extrinsic semi effect is on	conductor is increased, the pronounced
		Majority carriers
	(3) Minority & Majority carriers (4)	Junedon capacitance
80.	80. Mobility of holes is mobility of	electrons in intrinsic semiconductors.
		Less than (4) Cannot define
PHD	ID-EE-2023-24/(Elect. & Comm. Engg.)(SET-X)	

16		B
81.	If carrier modulated by a digital bit stream has one of the possible phases of 0°, 90°, 180° and 270°, then the modulation is called:	
	(1) BPSK (2) QPSK (3) QAM (4) MSK	
82.	A signal having uniformly distributed amplitude in the interval (-V, +V) is to be encoded using PCM with uniform quantization. The signal to quantization noise is determined by the:	
	(1) number of quantizing levels (2) sampling rate	
	(3) dynamic range to the signal (4) power spectrum of signal	
83.	In asynchronous TDM, for n signal sources, each frame contains m slots, where m is usually:	
	(1) $2n$ (2) greater than $2n$	
	(3) n (4) less than n	
84.	An optical fiber behaves as a birefringence medium due to differences in:	9
	(1) Effective R-I and core geometry	
	(2) Core-cladding symmetry	
	(3) Transmission/propagation time of waves(4) Refractive indices of glass & silica	
		9
85.	A single node fiber has mode field diameter 10.2 μm and $V = 2.20$. What is the core diameter of this fiber ?	de la companya de la
	(1) 11.1 μ m (2) 13.2 μ m (3) 7.6 μ m (4) 10.1 μ m	
86.	A multimode step index fiber has source of RMS spectral width of 60 nm and dispersion parameter for fiber is 150 psn m ⁻¹ km ⁻¹ . Estimate rms pulse broadening due to material dispersion:	93
	(1) 12.5 ns km^{-1} (2) 9.6 ns km^{-1} (3) 9.0 ns km^{-1} (4) 10.2 ns km^{-1}	
PHD-I		HD.

87.	A compared to planar LED structure efficiency effective emission are	
	(1) greater, lesser, reduced	(2) higher, greater, reduced
	(3) higher, lesser, increased	(4) greater, greater, increased
88.	The wavelength of RAPD with 70% et by:	fficiency and responsibility 0.689 A/W is given
	(1) 06 μm (2) 7.21 μm	(3) 0.112 μm (4) 03 μm
89.	An RC Snubber circuit is used to protect	et a thysistor against :
	(1) false triggering	(2) failure to turn on
	(3) switching transiants	(4) failure to commutate
90.	What is the backup duration for 600 V	A UPS ?
	(1) 30 to 45 minutes	(2) 15 to 20 minutes
	(3) 01 to 05 minutes	(4) 05 to 10 minutes
	TANGETT II wherehold voltage co	n he lowered hy :
91.	In a MOSFET the threshold voltage ca	
	(1) increasing the gate oxide thickness(2) reducing the substrate concentration	
	(3) increasing the substrate concentrate	
	(4) using the dielectric of lower const	
92.	The disadvantage of capacitor input L	C filter in rectifier is:
	(1) high cost, more weight and extern	al field produced by series inductor
		external field produced by series inductor
	(3) high cost, less weight	
	(4) low cost, more weight	
93	Which of the following architecture c	an be designed as an instrumentation amplifier?
	(1) Indirect current feedback	(2) Direct current feedback
	(3) Indirect voltage feedback	(4) Direct voltage feedback

18

94. The circuit as shown in Fig. 3, $V_O = V_{OA}$ for switch SW in position A and $V_O = V_{OB}$ for switch SW in position B. Assume that op amp is ideal. The value of $\frac{V_{OB}}{V_{OA}}$ is:



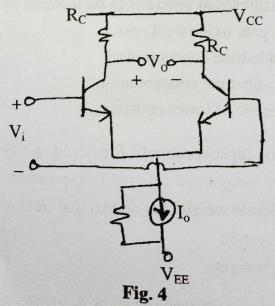
(1) 3

(2) 0.5

(3) 2

(4) 1.5

95. In the differential amplifier as shown in Fig. 4, the magnitude of the common-mode and differential-mode gains are A_{cm} and A_d , respectively. If the resistance R_E is increased, then:



- (1) A_{cm} increases
- (2) A_d increases
- (3) Common-mode rejection ratio increases
- (4) Common-mode rejection ratio decreases

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PHD

9

Consider the following statements regarding the circuit as shown in Fig. 5 96.

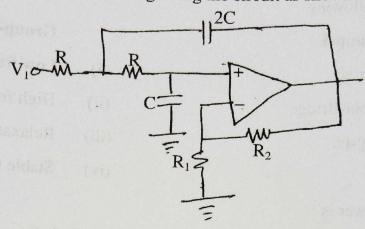


Fig. 5

- (i) The circuit represents an active low pass filter.
- (ii) The circuit represents a second order active filter.
- (iii) The circuit has a cut-off rate of 40 dB has decade.
- (1) (i), (ii) & (iii) are correct
- (2) (i) & (ii) are correct

(3) Only (i) is correct

- (4) (ii) & (iii) are correct
- An op-amp has open loop gain of 10⁵ and an open loop cut-off frequency of 10 Hz. If 97. this op-amp is connected as an amplifier with a closed gain of 100, then the new upper cut-off frequency is:
 - (1) 100 kHz
- (2) 1000 kHz
- (3) 10 Hz
- (4) 10 kHz
- converts Direct Current (DC) signals from the power supply units to 98. Alternate Current (AC) signals.
 - (1) micro controllers

(2) oscillators

(3) transformers

- (4) relays
- Which one of the following is an audio frequency oscillator?
 - (1) Wein bridge
- (2) Hartlay
- (3) Colpitts
- (4) Crystal

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Group-I

- (A) Hartlay
- (B) Wein-Bridge
- (C) Crystal

Correct answer is:

- (1) A-i, B-iii, C-ii
- (3) A-iv, B-i, C-ii

Group-II

- (i) Low frequency oscillator
- (ii) High frequency oscillator
- (iii) Relaxation oscillator
- (iv) Stable frequency oscillator
- (2) A-ii, B-1, C-iv
- (4) A-i, B-ii, C-iv

- 1. Fermi level for intrinsic semiconductor lies:
 - (1) At middle of the band gap
- (2) Close to conduction band
- (3) Close to valence band (4) None
- 2. Consider the transistor shown in Fig. 1:

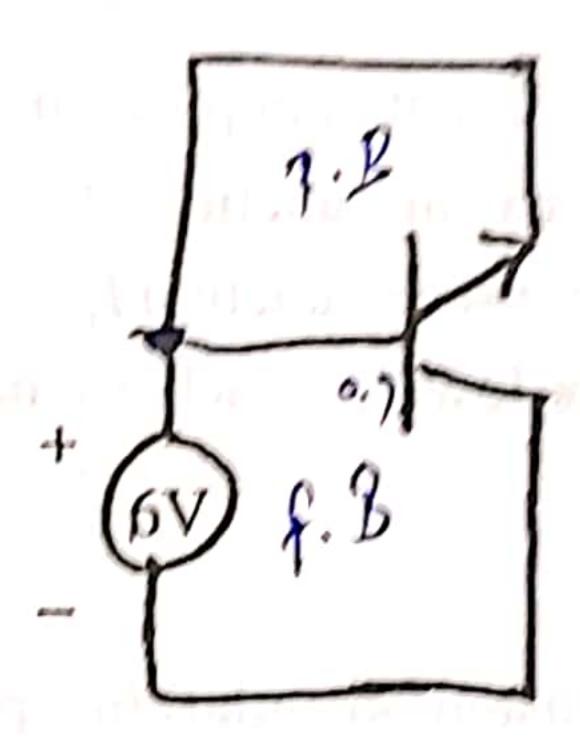


Fig. 1

The transistor is operating in:

- Forward-Active region
- (2) Reverse-Active region

(3) Saturation region

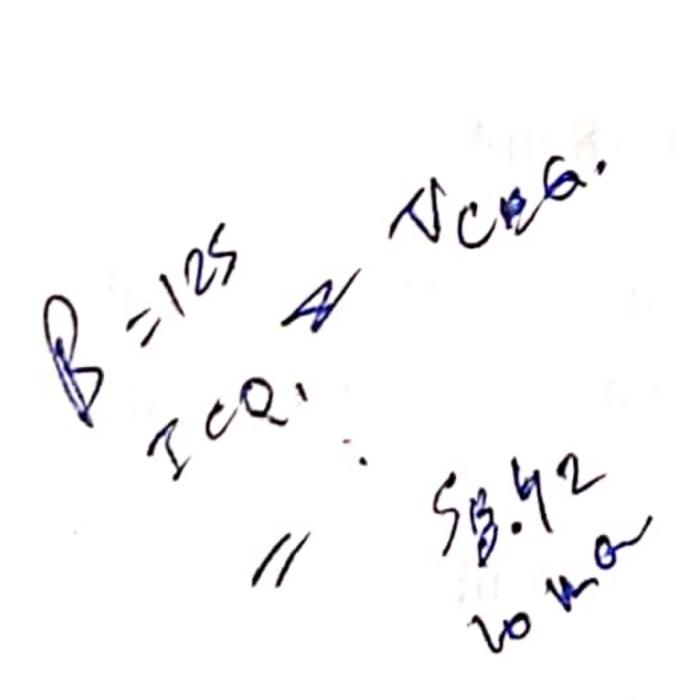
- (4) Cut off region
- 3. The electron concentration in silicon decreases linearly from 10¹⁶ cm⁻³ to 10¹⁵ cm⁻³ over a distance of 0.10 cm. The cross-sectional area of sample is 0.05 cm². The electron diffusion coefficient, D_n is given by 25 cm²/sec. The diffusion current in silicon will be:
 - (1) 0.36 mA
- (2) 3.6 mA
- (3) 0.18 mA
- (4) 18 mA
- 4. A silicon p⁺n junction has doping concentration of $N_a = 10^{18}$ cm⁻³ and $N_d = 5 \times 10^{15}$ cm⁻³. The cross-sectional area of the junction is $A = 5 \times 10^{-5}$ cm², what will be the capacitance for the applied reverse voltage, $V_R = 3 \text{ V}$?
 - (1) 0.521 pF
- (2) 0.005 nF
- (3) 1.04 nF
- (4) 2.61 nF
- 5. Consider on MOS structure with p-type silicon and $N_a = 6 \times 10^{15}$ cm⁻³. If the gate is aluminium then the metal semiconductor work function difference, ϕ_{ms} of the MOS structure will be:
 - (1) -2.256 V
- (2) -0.944 V
- (3) 7.344 V
- (4) 4.144 V

- 6. The phenomenon known as "Early Effect" in a bipolar transistor refers to a reduction of base-width caused by:
 - (1) Electron-hole recombination base
 - (2) The forward biasing of emitter-base junction
 - (3) The early removal of stored base charge during saturation to cut-off region
 - (4) The reverse biasing of base-collector junction
- 7. The common short circuit current gain β of a transistor:
 - (1) is a monotonically increasing function of collector current I_C
 - (2) is a monotonically decreasing function I_C
 - (3) increasing with I_C , for low I_C reaches a maximum and then decrease with further increase in I_C
 - (4) is not a function of I_C
- 8. The built-in-potential (diffusion potential) in a pn-junction:

- increases with increase in temperature
- (ii) increases with increase in doping in the dioping levels of two sides
- (iii) is equal to the average of the Fermi levels of two sides
- (iv) is equal to the difference of the Fermi levels of two sides

Which of the following statement is correct?

- (1) (i), (ii) & (iv) (2) (i) & (ii)
- (3) (ii) & (iii)
- 9. The current gain of the transistor as shown in Fig. 2 is $\beta = 125$. The Q-point values $(I_{CQ} & V_{CEQ})$ are:



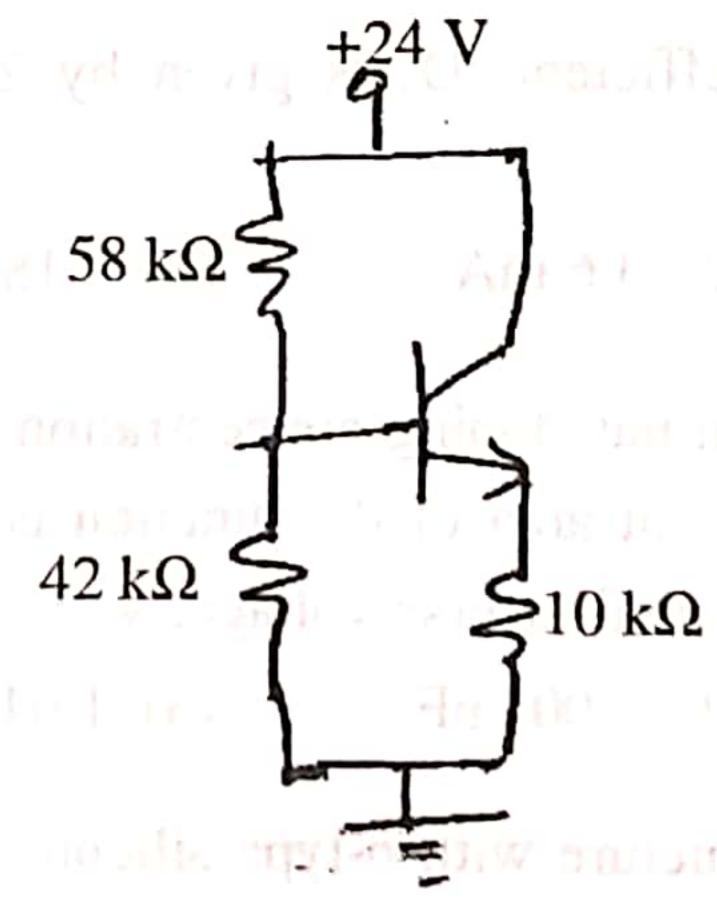


Fig. 2

- (2) 0.913 mA & 16.23 V
- (3) 0.913 mA & 14.8 V (4) 0.418 mA & 18.43 mV

(1) 0.418 mA & 20.4 V

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- The collector to emitter cut-off current (I_{CEO}) to base cut-off current (I_{CBO}) is as α is the *CB* current gain of transistor:
 - $(1) I_{CEO} = I_{CBO}$

- (2) $I_{CEO} = \alpha I_{CBO}$ (4) $I_{CEO} = \frac{I_{CBO}}{1-\alpha}$
- 11. The abrupt truncation of Fourier series results in oscillations in:
 - (1) both pass band & stop band
- (2) only pass band

(3) only stop band

- (4) none of these
- The trigonometric Fourier series representation of a function with half wave symmetry consists of:
 - even hormonics

(3) sine terms only

- (4) cosine terms only
- 13. The circuit as shown in Fig. 10 converts a binary code Y_1 Y_2 Y_3 into:

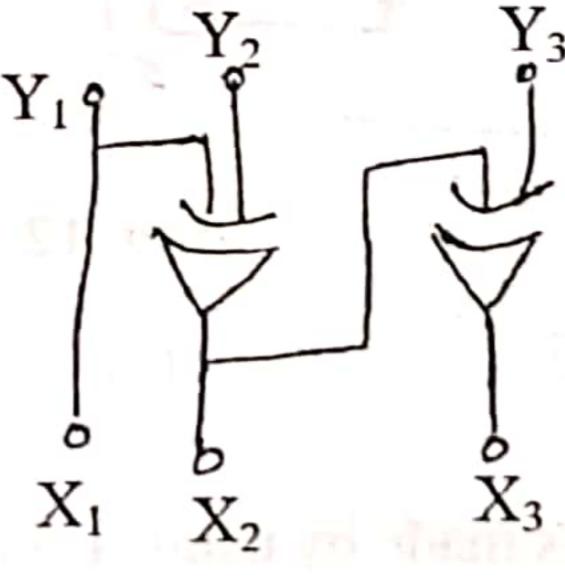


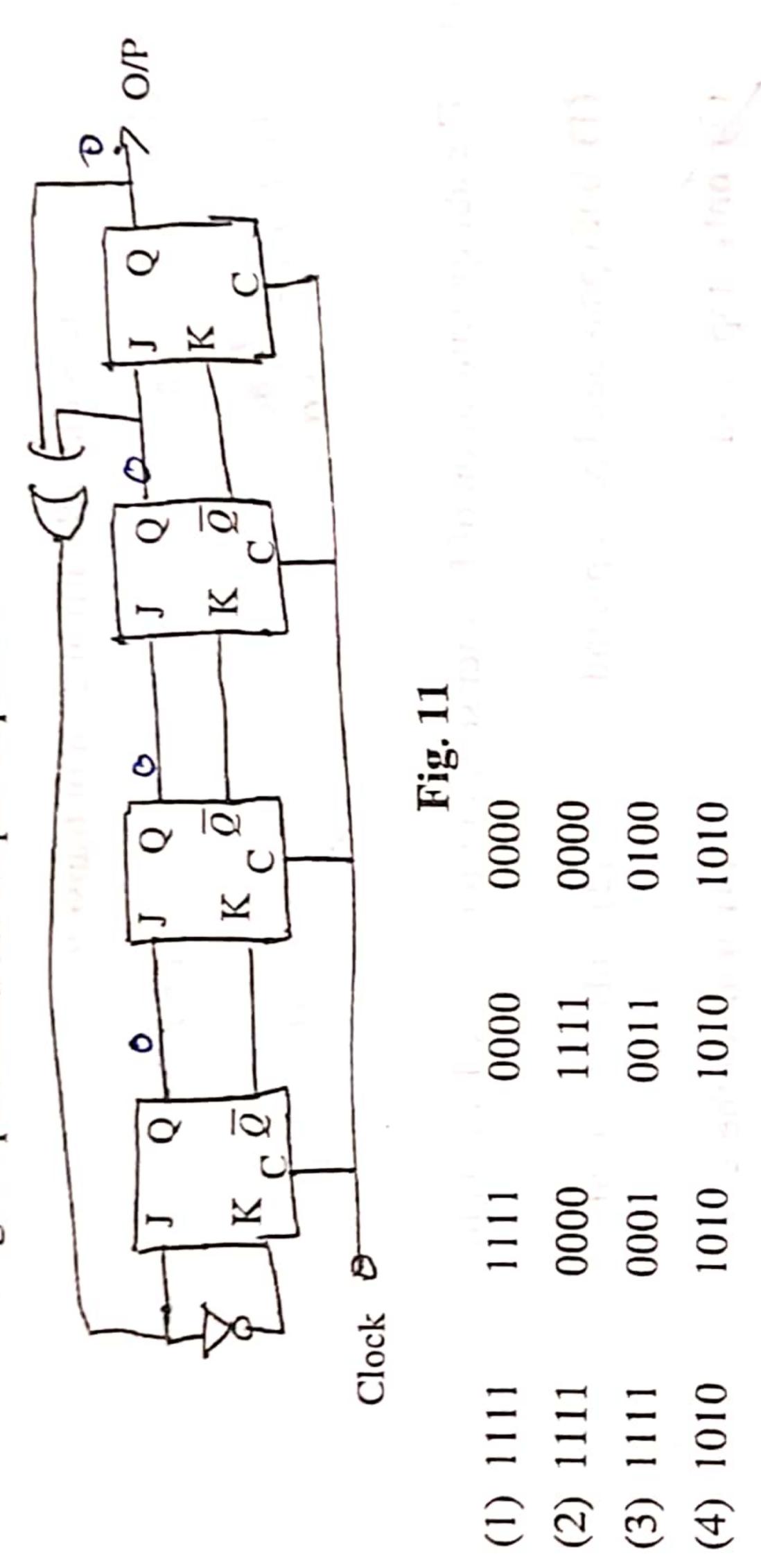
Fig. 10

(1) Hamming code

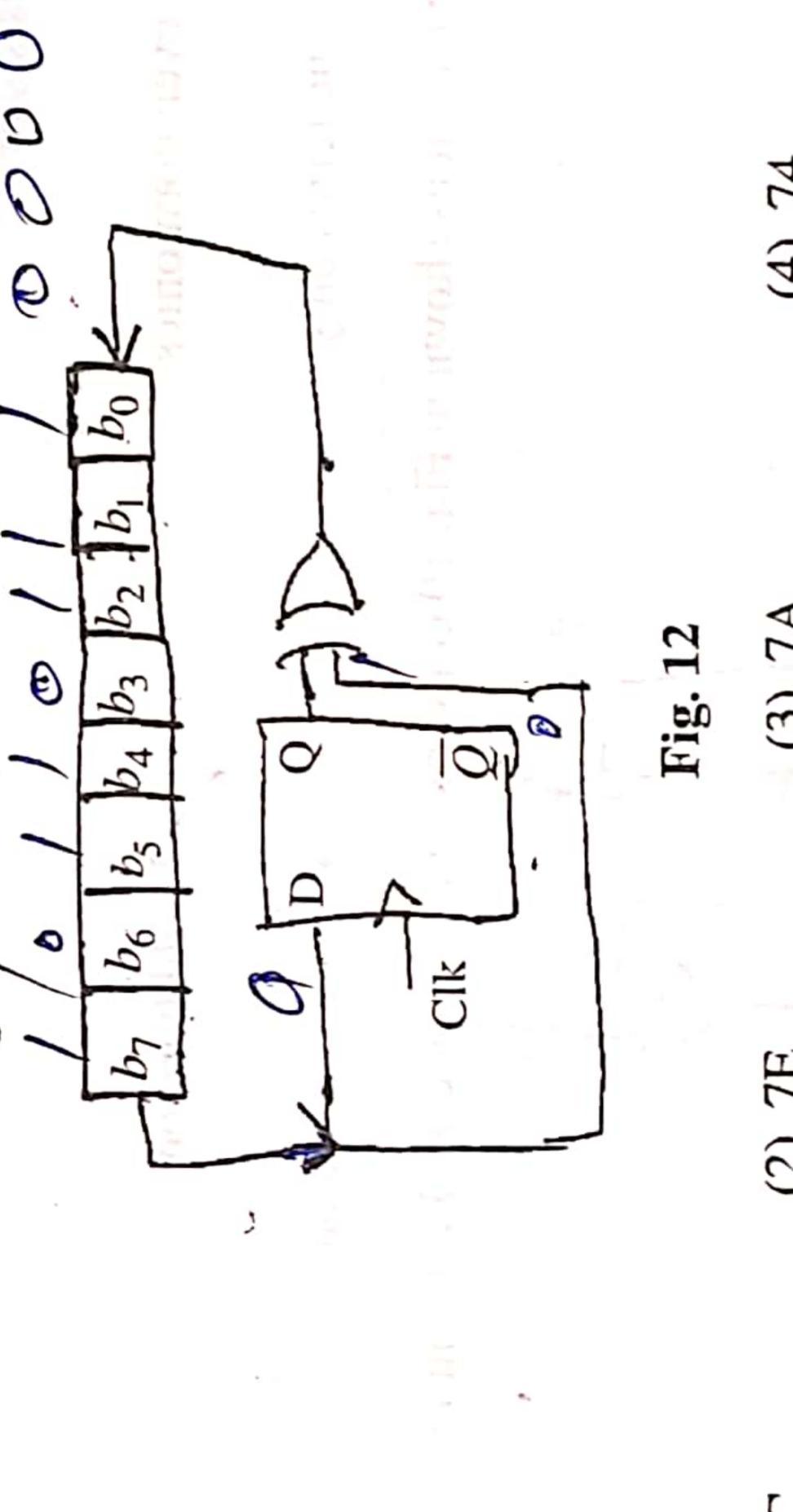
(2) BCD code

Gray code

Excess 3-code



B7H, byte be shown in Fig. contains register register will initially



(3)

using a made counter switch-tail

SR Flip-

(2)

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- a seriel-in-serial shift register Ξ Ξ Ξ
- a serial-in-parallel-out shift register
- a parallel-in-serial-out shift register
- a serial-in-parallel-out shift register
- slope integration type analog to digital converters provide:
- conveters of types compared to all other higher speeds
- poor rejection of power supply hum
- same A/D converters of types other all 5 compared resolution number of bits better Dual
 (1) h
 (2) p
 (3) b
 - very good accuracy without putting extreme requirements on component stability 4
- 5 value corresponding resister the converter, weighted resistor D/A 4-bit be: In a
 - will (1)
- $16 \, \text{k}\Omega$ (3)
- (4) 32 kΩ
- resolution uses a clock frequency of 2 = 6.000 V is = 1 mV. The digital output for V_A An 8-bit digital ramp ADC with a 40 mV reand a comparator with $V_T = 1 \text{ m}^{xy}$ (1) 1011111

 - 10111 (3) 100
 - (4) 10010110
- one of the possible phases of 0°, modulated by a digital bit stream has 270°, then the modulation is called If carrier 180° and
- (1) BPSK
- (2) QPSK
- QAM (3)
- (4) MSK
- quantization noise +V) is > le in the interval (signal to quantization. amplitud uniformly distributed PCM with uniform determined by the: having using A signal encoded
- (1) number of quantizing levels
- sampling rate $\overline{0}$
- dynamic range to the signal
- spectrum of signal er pow 4

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failure

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(1) 30 to 45 minutes (3) 01 to 05 minutes

(2) 15 to 20 minutes

minutes (4) 05 to

Which one of the following sets of equations is independent of Maxwell's equations

- Two curl equations
 Two divergence equations
 Both curl and divergence equations
 Two curl equations combined with continuity eq

The state of the s

1 onto incident from region wave The lowest frequency at which a uniform plane boundary at z = 0 will have no reflection is:

(1) 45°

000 300

 \overline{C}

 $(3) 90^{\circ}$

3

antenna power the transmitting the and , the total power received cm^2 from 500 A receiving antenna is located 100 m away antenna is receiving receiving location is 2 mW/m² effective area of the

- (1) 10 µW
- (2) 100 nW
- (3)

 $10\,\mathrm{nW}$

Which of these is not true of a lossless line?

24 160

- j Z_0 for a shorted line with $l = \lambda/8$ (1) $Z_{in} = -$
 - Z₀ for a mached line (2) $Z_{in} =$
- $j \infty$ for a shorted line with $l = \lambda/4$ $(3) Z_{in} =$
 - (4) All of the above

Laplace's equation Which of the following potentials does not satisfy

(1)
$$V = 2x + 5$$

(2)
$$V = \rho \cos \phi + 1$$

(3)
$$V = r \cos \phi$$

(4)
$$V = \frac{10}{r}$$

	41.		40.	39.	38	37		36	8
(4) Carrier velocities are very high.	Which of the following options about tunnel diodes is <i>incorrect</i> ? (1) The width of depletion region is high as compared to the p-n junction. (2) Impurity concentration is high as compared to p-n junction. (3) The V-I characteristics show the negative resistance region.	 (1) better than that of an envelope detector (2) better than that of a synchronous detector (3) identical than that of a synchronous detector (4) poorer than that of envelope detector 	 M/2 kHz M/16 kHz MHz MHz M/8 kHz Mile moise performance of a square low demodulator of AM signal is: 	The bit rate of the digital communication system is MKBPS. The modulation used is 16 QAM. The minimum bandwidth required for ideal transmission is:	If in a broadcasting studio, a 1000 kHz carrier is modulated by an audio signal of frequency range 100-5000 kHz, the width of channel is: (1) 5 kHz (2) 4.9 kHz (3) 995 kHz (4) 10 kHz	A zero mean white Gaussian noise is passed through an ideal low pass filter of bandwidth 10 kHz. The output of the samples so obtained would be: (1) Correlated (2) Statistically independent (3) Incorrelated (4) Orthogonal	 (2) Its circulation is identically zero (3) Its curl is identically zero (4) The potential difference between any point is zero 	By saying that the electrostatic field is conservative, we do <i>not</i> mean that: (1) It is the gradient of a scalar potential	

The following

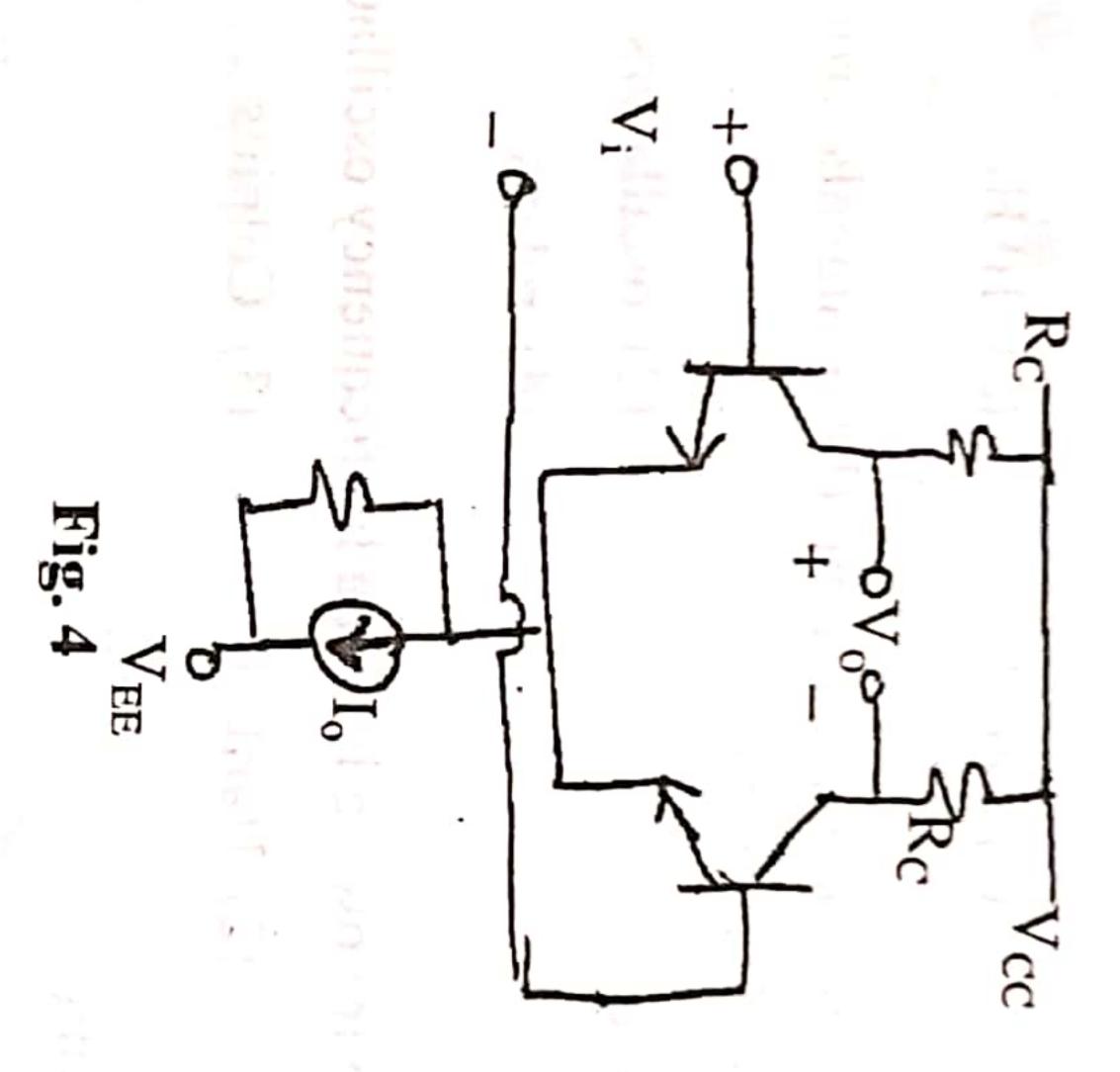
structures are used i

High Electron Mobility

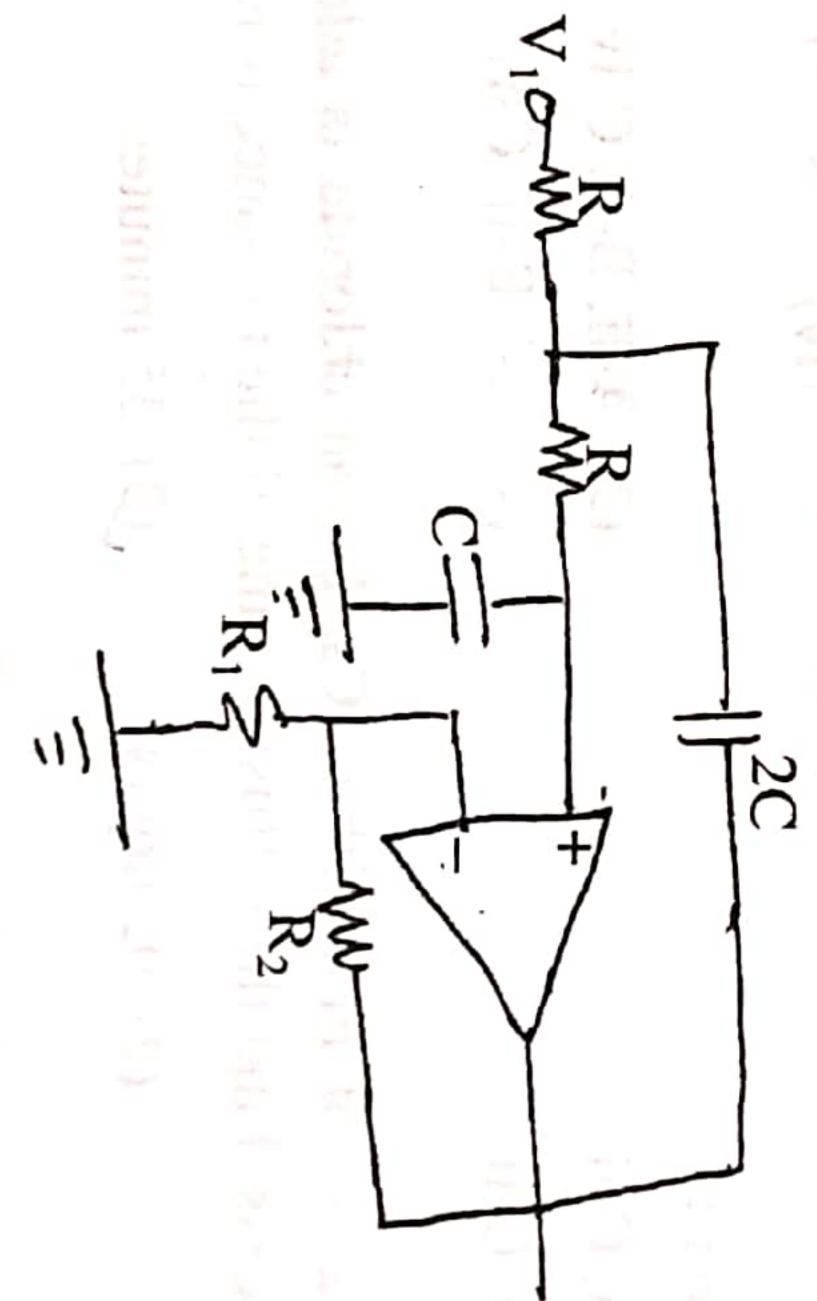
Transistor:

effect is on
$= V_{01}$ filer?

increased, magnituc cc R_E is



- (1) A_{cm} increases
- (2) A_d increases
- (3) Common-mode rejection ratio increase
- (4) Common-mode rejection ratio decreases
- the following statements



Hig. 5

- (i) The circuit represents an active low pass filter
- (iii) The circuit has a cut-off rate of 40 dB has deca
- (1) (i), (ii) & (iii) are correct

(2) (1) & (11) are corre

3) Only (i) is correct

4) (ii) & (iii) are correct

O

57.	An op-amp has open loop gain of 105 and an open loop cut-off frequency of 10 Hz. If
	this op-amp is connected as an amplifier with a closed gain of 100, then the new upper
	cut-off frequency is:

1000 kHz (5)

(3)

10 kHz

supply power the from signals Direct Current Current (AC) signals converts Alternate

micro controllers 1

oscillators (2)

3) transformers

relays

Which one of the following is an audio frequency oscillator Wein bridge (1)

Hartlay

(7)

Colpitts (3)

Match the following

Group-I

Hartlay

Wein-Bridge (B)

Crystal \bigcirc

Group-II

oscillator Low frequency \odot

oscillator High frequency (ii)

Relaxation oscillator (iii)

oscillator Stable frequency (iv)

> answer is Correct

A-i, B-iii, $\widehat{\mathfrak{S}}$

A-iv, B-i,

A-ii, B-1, C-iv \overline{C}

C-1. 4

ij. an impurity furnance is heated upto 1200°C as added chloride is the Boron diffusion time, if ICs, monolithic Find the Jo fabrication diffusion process. the 卫

01 hour 1

02 hours \overline{C}

35 minutes

20 minutes 4

How the aluminium film coating is carried out in metalization process

Heating and Pouring aluminium in required place Ξ Ξ Ξ

tungsten Placing the aluminium in required place and then heating it using

condensed the and Aluminium is vaccum evaporated

of the mentioned None

- low resistivity current path from n-type layer to n⁺ contact layer \equiv
- contact layer A low resistivity current path from p-type layer to n⁺
- contact layer A high resistivity current path from n-type layer to n+ (2)
- (4) A high resistivity current path from p-type layer to n⁺ contact layer
- voltage model is scaled as The carrier density in the channel in the constant

(π)(β)(β)(β)(β)(β)

 \mathfrak{S}

All of the mentioned 4

- any factor is The parameter which is not scaled to
- (1) Power speed product

Switching energy \overline{C}

1

(3) Channel resistance

All of the mentioned

A digital CMOS IC operating at 15 MHz clock frequency consumes 130 mW, the same The static power mW power. consumes 100 10 MHz clock frequency consumption of the IC is at IC operating

(1) 20 mW

(2) 40 mW

(3) 50 mW

(4) 90 mW

- 17 19 19 19 What should be the width of metal 1 and metal 2 layers?

(1) 3x, 3x

(2) 2*\(\gamma\)* 3*\(\gamma\)*

(3) 2h,

lλ (4) 3λ,

components individual ICs, as in thick and thin film nseq are outside.

7(1) Transistors
(3) Diode

All of the mentioned Active elements E

- oxygen ways either using two ij. achieved growing thicker oxides? can be substrate vapour for on SiO_2 water Growth of using
- (1) dry oxidation can be used

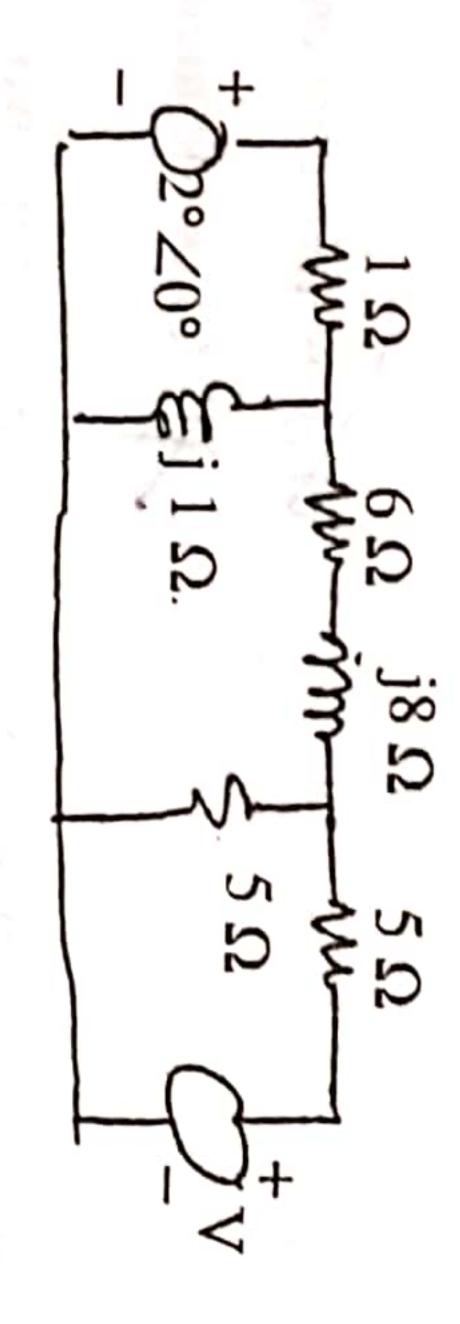
any of dry &

- wet oxidations can be used
- dry oxidation followed by wet oxidation (4) wet can be used

S. S. Marie P. Marie C. S. Commission of the Com

- process is: stripping then development, the order in Si which etching, alignment out standard photolithography Sis photoresist
- (1) P-Q-R-S
- (2) Q-P-S-F
- (3) P-S-R-Q
- 4) R-P-Q-S

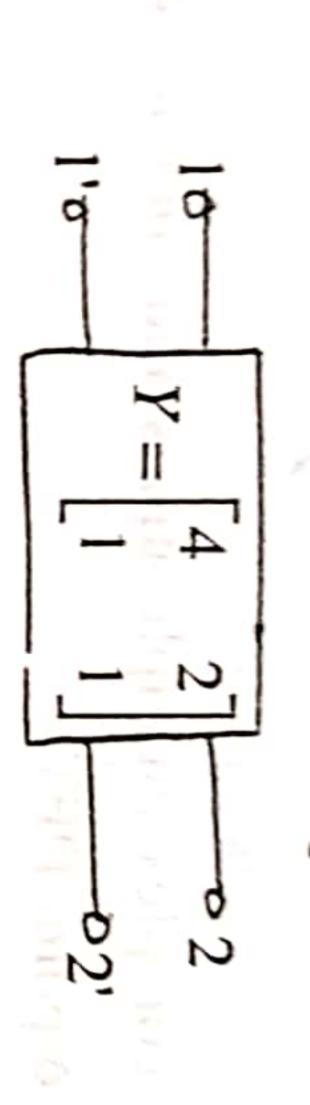
- 1. A network is said to be linear if and only if
- Ξ the response is proportional to the excitation function
- (2) the principle of superposition applies
- (3) the principle of homogeneity applies
- (4) both (2) and (3)
- equivalent will be terminals. battery charger can drive If is able • to c battery n its at its output Thevenin's
- (1) 7.5 V in series with 0.5 Ω
- (2) 12.5 V in series with 1.5 Ω
- (3) 7.5 V in parallel with 0.5 Ω
- (4) 1.25 V in parallel with 1.5 Ω
- In is: given circuit as shown istor is the

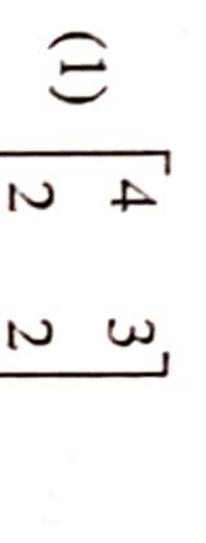


Fig

- $20\sqrt{2}$ $\angle 45^{\circ}$ (2)
-)°
- 20 <u>Z45</u>°
- 4) 20√2 <u>Z30</u>°

connected acoss parameters $\mathbf{a}\mathbf{s}$ shown in Fig. terminal 5 is

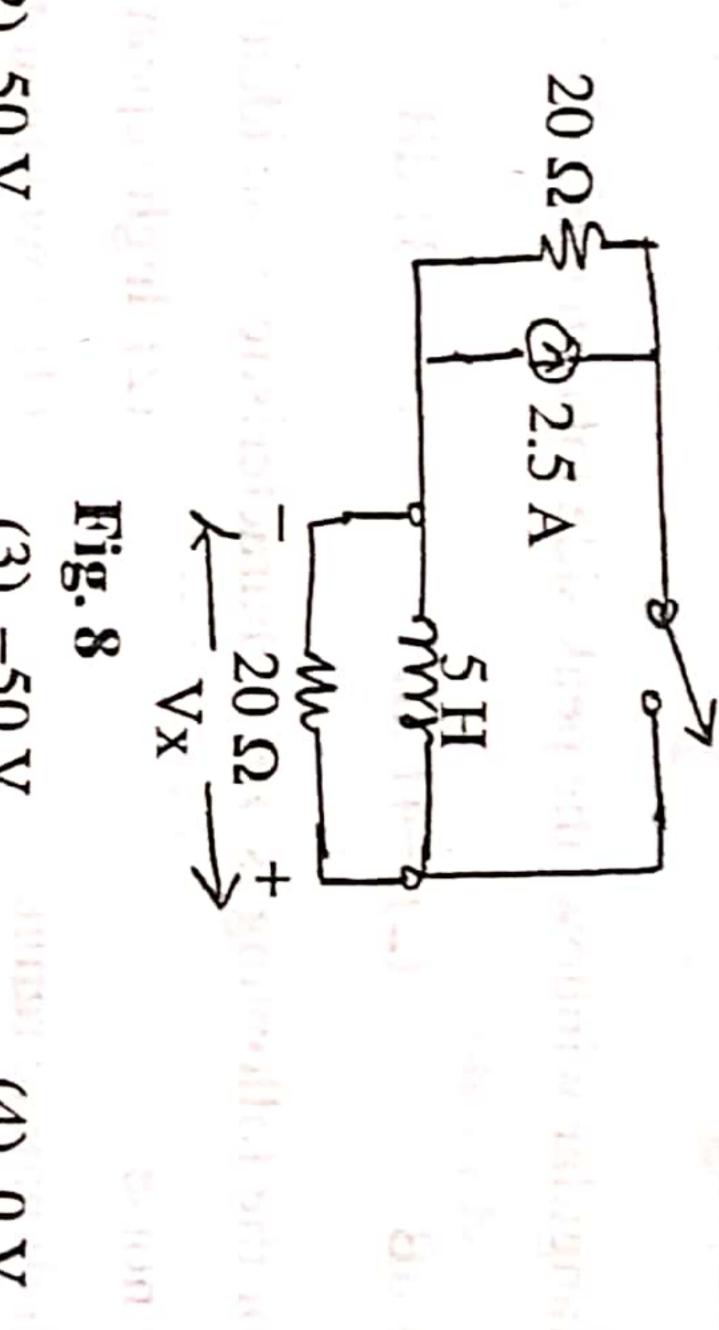




$$\begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

$$\begin{bmatrix} 5 \\ 0 \\ 2 \end{bmatrix}$$

opening at t = the given circuit as The voltage shown vx in H at ie before



50

000

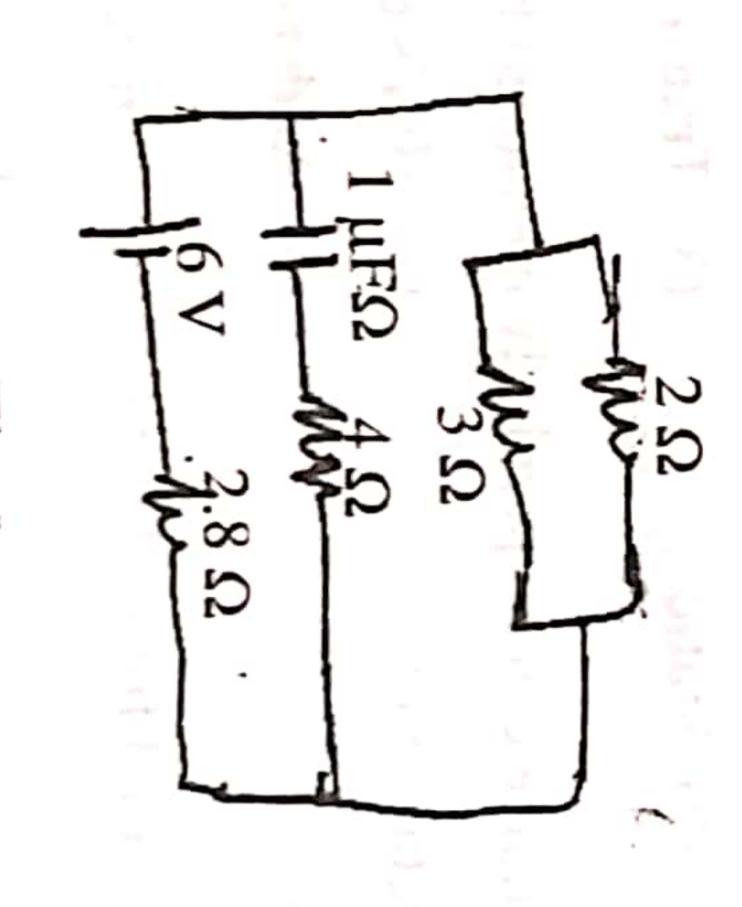
(1) 25 V

(2) 50 V

(3) -50

(4) 0 V

What is battery is negligible and value the steady state current in stance of



F. 6.

(1) 1.5 /

(2) 1.2

(3) 0.6

(4) 0.9 A

is Fourier Transform of

$$\frac{1}{1+ja\omega}$$

(2)
$$\frac{1}{1-ia0}$$

$$(3)$$
 $\frac{1}{1+ae^{-j\omega}}$

$$\frac{4}{1-ae^{j6}}$$

involved additions complex and multiplications of 8-point DFT The number of complex computation

and to is known as \mathbb{C} Non-linearity in the relationship between

unwarping (3)

- frequency mixing 4
- magnitude in dB window, the peak side lobe For rectangular

$$(1) -58 dB$$

$$(2)$$
 -41 dB

$$(4) - 13 dB$$

Which of the following is not a characteristic of an ideal transducer

low linearity

(3) high dynamic range

- 4
- the performance 5 time varying signal transducer Jo characteristics transducer when it is subject to The

Jo

- Dynamic
- Static (7)
- **Transiant** (3)
- and Ξ Both 4
- High Q coils inductance can be precisely measured by
- Maxwells inductance bridge Ξ
- Hay's bridge Ħ

Schering bridge (3)

- Anderson's bridge 4
- rary measurements of flow The device which is used for making tempor
- Venturi (1)

Dull flow tube (2)

> Orfice plate (3)

Pitot static tube 4

system response IS system c(t) + 5c(t) σ $\frac{-c(t)+c}{dt^2}$ d^2

 \mathbf{c}

(1) Undamped

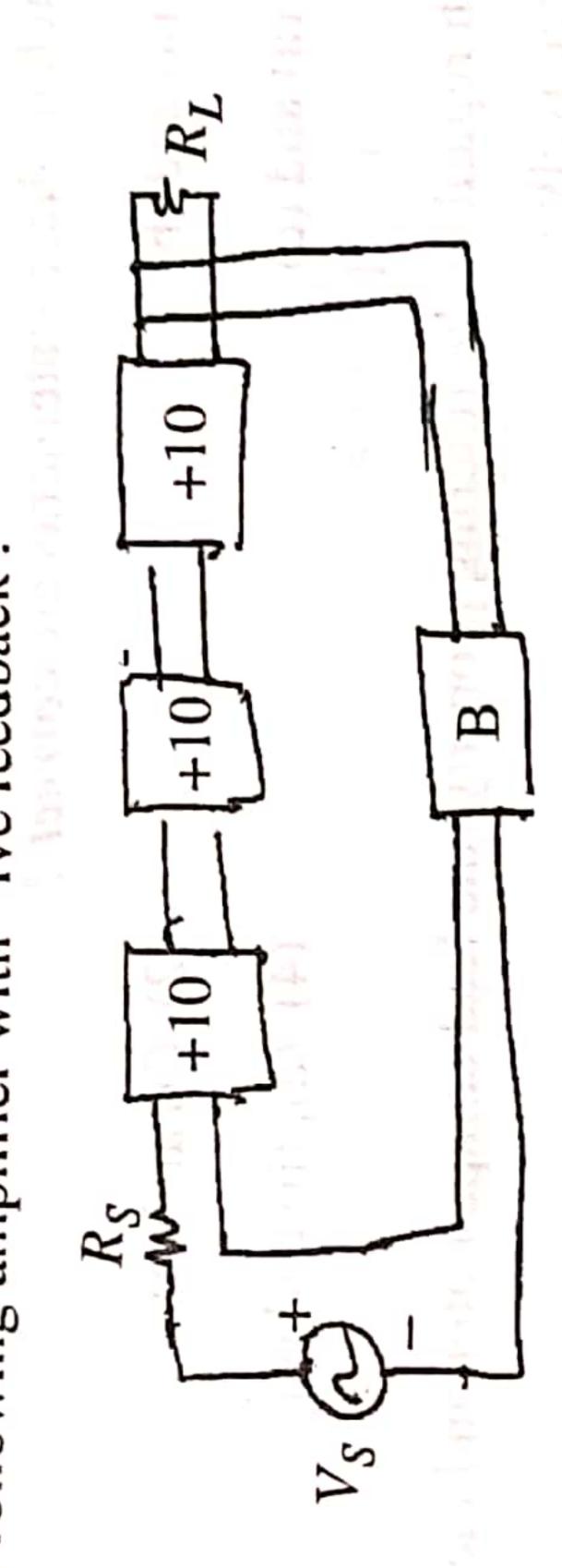
(7)

(3) Critically damped

4

-

ive feedbac amplifier the following er Consid



• If the closed loop gain

$$(1) -11 \times 10^3$$

$$(2) + 11 \times 10^{-}$$

$$(3) -9 \times 10$$

$$(4) +9 \times 10^{3}$$

5

- , what + s)s state error when it is subjected to the input r(t) = 10G(s)transfer function loop open has A system
- (1) 0.4

 \overline{C}

infinit (3)

The given characteristics polynomial

- (1) zero root in RHS in s-plane
- (2) one root in RHS of s-plane
- (3) two roots in RHS of s-plane
- (4) three roots in RHS of

statements
lowing
fol
the
Consider
89.

In root-locus plot, the breakaway points

- (a) need not always be on real axis alone
- (b) must lie on root loci
- (c) must lie on 0 and 1

Which of these statements are correct?

(1) (a) and (b)

(2) (b) and (c)

(3) (a) and (c)

- (4) (a), (b) and (c)
- With regard to the filtering property, the lead compensator and the respectively
- (1) high pass and low pass filters
- (2) low pass and high pass filters
- (3) both low pass filters
- (4) both high pass filters
- states the 8086 the READY input of respond able When the memory or I/O device by inserted between
- (1) $T_3 & T_4$ disabling

(2) $T_2 & T_3$ disabling

(3) $T_1 & T_2$ enabling

- (4) $T_3 & T_4$ enabling
- in following instructions AL, AX and DX registers of 8086 are used
- (1) Multiply, Divide, I/O and Translate
- (2) Multiply, Divide, I/O and Decimal adjustments
- Multiply, Divide, I/O, Translate and Decimal (3)
- (4) Multiply, Divide and I/O

19

The effective and physical address = 3000= 5980 H, CSLIST AX = 1000H 0009 2490 H, = 5000 H andMOV LIST [BP], AX is given by = 1234 H, [BP]2000 H, ES If [BX] DS = 20

7E1 (3) (2) 8E10, 68E10 8E10, 28E10 (1)

0,27E10

(4) 7E10, 67E10

execution after the and CF AX of the contents = 1F89H, what are If CF = 1, AX = 1F89] following instructions?

MOV CL, 2
RCL AX, CL

AX = 2A6BH & CF = 1(1)

7EA6H & CF = $\overline{\mathfrak{S}}$

A STATE OF THE STA

AX = 7FB7H & CF = 0

= 0F89H & CF AX 4

8

devices technology for designing Why is CHMOS technology preferred over HMOS tec MCS-51 family?
(1) Due to higher noise immunity
(2) Due to lower power consumption
(3) Due to higher speed
(4) All of the above

AM address in MCS-Which is the only register without internal on-chip R

(1) Stack pointer

(3) Data printer

(4) Timer is the only register without intervention (4) Timer is the only register of the only register is the only register of the only register is the only register of the only register of

Program counter

Timer register

category the 5 belong not does [7 (Pins 10-1 functions Which among the below mentioned falternate functions performed by Port-3

Read/write control signals
 Internal interrupts

(2) Serial ports

(4) External interrupts

0 sent? overall instruction single How for

- three bytes and 17 45 single byte, 45 two bytes
 - (2) 45 single byte, 45 two bytes and 15 three bytes
- (3) 55 single byte, 40 two bytes and 20 three bytes
- (4) 40 single byte, 55 two bytes and 17 three bytes

flag by moving the bitmodify CY Which rotate instructions has an ability respectively to accumulator?

(2) RRC & RLC (1) RR & RL

(4) RL

count Which instructions affect the program

(1) CALL & RETURN

(3) PUSH

(2) RETURN & JUMP

Total No. of Printed Pages: 21

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU

D

ARE ASKED TO DO SO)

SET-X

10004

PHD-EE-2023-24

Electrical & Communication Engineering

		Sr. No
Time: 11/4 Hours	Max. Marks : 100	Total Questions: 100
Roll No. (in figures) 2300 404	(in words)	
Name Palkit	Date of Birth	15-1-93
Father's Name Ramph	Mother's Name	was and the same of the same o
Date of Examination	- H	\vee
		Now
(Signature of the Candidate)		(Signature of the Invigilator)

CANDIDATES MUST READ THE FOLLOWING INFORMATION/INSTRUCTIONS BEFORE STARTING THE QUESTION PAPER.

- 1. All questions are compulsory.
- 2. The candidates must return the question booklet as well as OMR Answer-Sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfairmeans / mis-behaviour will be registered against him / her, in addition to lodging of an FIR with the police. Further the answer-sheet of such a candidate will not be evaluated.
- 3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
- 4. Question Booklet along with answer key of all the A, B, C & D code shall be got uploaded on the University Website immediately after the conduct of Entrance Examination. Candidates may raise valid objection/complaint if any, with regard to discrepancy in the question booklet/answer key within 24 hours of uploading the same on the University Website. The complaint be sent by the students to the Controller of Examinations by hand or through email. Thereafter, no complaint in any case, will be considered.
- 5. The candidate *must not* do any rough work or writing in the OMR Answer-Sheet. Rough work, if any, may be done in the question booklet itself. Answers *must not* be ticked in the question booklet.
- There will be no negative marking. Each correct answer will be awarded one full mark.
 Cutting, erasing, overwriting and more than one answer in OMR Answer-Sheet will be treated
 as incorrect answer.
- 7. Use only Black or Blue Ball Point Pen of good quality in the OMR Answer-Sheet.
- 8. Before answering the questions, the candidates should ensure that they have been supplied correct and complete booklet. Complaints, if any, regarding misprinting etc. will not be entertained 30 minutes after starting of the examination.

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1. Which of the following is not a characteristic of an ideal transducer?

(1) low noise

(2) high repeatability

(3) high dynamic range

(4) low linearity

2. The characteristics of transducer refer to the performance of the transducer when it is subject to time varying signal.

- (1) Dynamic
- · (2) Static
- (3) Transiant
- (4) Both (1) and (2)

3. High Q coils inductance can be precisely measured by:

- (1) Maxwells inductance bridge
- (2) Hay's bridge

(3) Schering bridge

(4) Anderson's bridge

4. The device which is used for making temporary measurements of flow is:

(1) Venturi

(2) Dull flow tube

(3) Orfice plate

(4) Pitot static tube

5. The response c(t) of a system is described by the differential equation $\frac{d^2}{dt^2}c(t) + 4\frac{d}{dt}c(t) + 5c(t) = 0.$ The system response is:

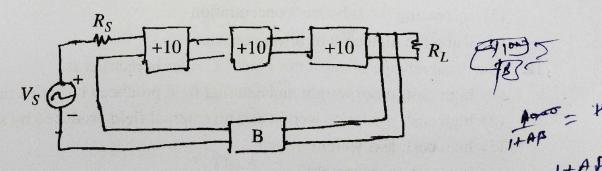
(1) Undamped

- (2) Under damped
- (3) Critically damped

(4) Oscillatory



6. Consider the following amplifier with –ive feedback :



If the closed loop gain of the above amplifier is +100, the value of B will be:

$$(1) -11 \times 10^3$$

$$(2) +11 \times 10^3$$

$$(3) -9 \times 10^3$$

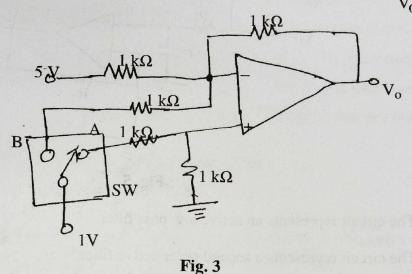
$$(4) +9 \times 10^3$$

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P. T. O.

/.	A system has open loop transf	100	
	ransier functi	ion $G(s) = \frac{10^{\circ}}{s(s+1)(s+2)}$, what is the steady	
	A system has open loop transfer function $G(s) = \frac{10^{\circ}}{s(s+1)(s+3)}$, what is the s state error when it is subjected to the input $r(t) = 10 + 2t + 3/2^{t^2}$?		
	(1) 0.4	$r(t) = 10 + 2t + 3/2^{t^2} ?$	
8.	(4) 4	(3) infinity (4) none of these	
	The given characteristics polynomial s^4 .	$+s^3 + 2s^2 + 2s + 3 = 0$ has:	
	2010 root in RHS in s-plane	(2) one root in RHS of s-plane	
9.	(3) two roots in RHS of s-plane	(4) three roots in RHS of s-plane	
9.	Consider the following statements:		
	In root-locus plot, the breakaway points		
	(a) need not always be on real axis alone		
	(b) must lie on root loci		
	(c) must lie on 0 and 1		
	Which of these statements are <i>correct</i> ?		
	(1) (a) and (b)	(2) (b) and (c)	
	(3) (a) and (c)	(4) (a), (b) and (c)	
10.	With regard to the filtering property, the	lead compensator and the lag compensator are	
	respectively:	we all the thought the se	
	(1) high pass and low pass filters	(2) low pass and high pass filters	
	(3) both low pass filters	(4) both high pass filters	
11.	In a MOSFET the threshold voltage can	be lowered by : V	
	(1) increasing the gate oxide thickness	m · m	
	(2) reducing the substrate concentration		
	(3) increasing the substrate concentration	n	
	(4) using the dielectric of lower constant		
12.			
	high cost, more weight and external		
4.4	(2) high cost, moderate weight and no ex	xternal field produced by series inductor	
	(3) high cost, less weight		
	(4) low cost, more weight		
13.		be designed as an instrumentation amplifier?	
	(1) Indirect current feedback	(2) Direct current feedback	
	(3) Indirect voltage feedback	(4) Direct voltage feedback	
	EE-2023-24/(Elect. & Comm. Engg.)(SE	T-Y)/(D)	
PHD-	EE-2023-24/Liter & Comm. Engg./(SE	(T-A)(D)	

14. The circuit as shown in Fig. 3, $V_O = V_{OA}$ for switch SW in position A and $V_O = V_{OB}$ for switch SW in position B. Assume that op amp is ideal. The value of $\frac{V_{OB}}{V_{OA}}$ is:



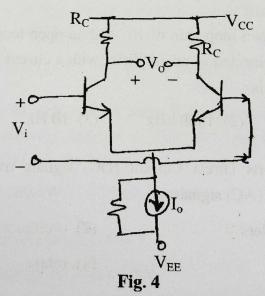
(1) 3

(2) 0.5

(3) 2

(4) 1.5

15. In the differential amplifier as shown in Fig. 4, the magnitude of the common-mode and differential-mode gains are A_{cm} and A_d , respectively. If the resistance R_E is increased, then:



REA.
TOTVOER
V=TR-123

(1) A_{cm} increases

- (2) A_d increases
- (3) Common-mode rejection ratio increases
- (4) Common-mode rejection ratio decreases

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P. T. O.

16. Consider the following statements regarding the circuit as shown in Fig. 5

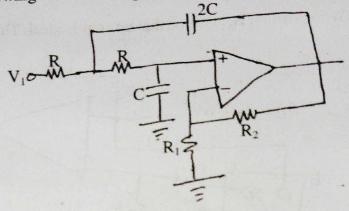


Fig. 5

- (i) The circuit represents an active low pass filter.
- (ii) The circuit represents a second order active filter.
- (iii) The circuit has a cut-off rate of 40 dB has decade.
- (1) (i), (ii) & (iii) are correct
- (2) (i) & (ii) are correct

(3) Only (i) is correct

- (4) (ii) & (iii) are correct
- 17. An op-amp has open loop gain of 10⁵ and an open loop cut-off frequency of 10 Hz. If this op-amp is connected as an amplifier with a closed gain of 100, then the new upper cut-off frequency is:
 - (1) 100 kHz
- (2) 1000 kHz
- (3) 10 Hz
- (4) 10 kHz
- 18. converts Direct Current (DC) signals from the power supply units to Alternate Current (AC) signals.
 - (1) micro controllers

(2) oscillators

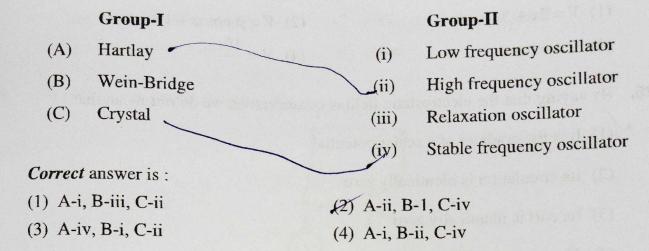
(3) transformers

- (4) relays
- 19. Which one of the following is an audio frequency oscillator?
 - (Y) Wein bridge
- (2) Hartlay
- (3) Colpitts
- (4) Crystal

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20. Match the following:



- 21. Which one of the following sets of equations is independent of Maxwell's equations?
 - (1) Two curl equations
 - (2) Two divergence equations
 - (3) Both curl and divergence equations
 - (4) Two curl equations combined with continuity equation
- 22. The lowest frequency at which a uniform plane wave incident from region 1 onto the boundary at z = 0 will have no reflection is:
 - (1) 45°
- $(2) 30^{\circ}$
- $(3) 90^{\circ}$
- $(4) 60^{\circ}$
- 23. A receiving antenna is located 100 m away from the transmitting antenna. If the effective area of the receiving antenna is 500 cm² and the power density at the receiving location is 2 mW/m², the total power received is:
 - $(1) 10 \mu W$
- (2) 100 nW
- (3) $100 \mu W$
- (4) 10 nW

- 24. Which of these is not true of a lossless line?
 - (1) $Z_{in} = -j Z_0$ for a shorted line with $1 = \lambda/8$
 - (2) $Z_{in} = Z_0$ for a mached line \checkmark
 - (3) $Z_{in} = j \infty$ for a shorted line with $1 = \lambda/4$
 - (4) All of the above

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P. T. O.

D

Which of the following potentials does not satisfy Laplace's	equation	
--	----------	--

(1) V = 2x + 5

 $(2) V = \rho \cos \phi + 10$

(3) $V = r \cos \phi$

(4) $V = \frac{10}{10}$

26. By saying that the electrostatic field is conservative, we do not mean that:

(1) It is the gradient of a scalar potential

(2) Its circulation is identically zero

(3) Its curl is identically zero

(4) The potential difference between any point is zero

27. A zero mean white Gaussian noise is passed through an ideal low pass filter of bandwidth 10 kHz. The output of the samples so obtained would be:

(1) Correlated

(2) Statistically independent

(3) Incorrelated

(4) Orthogonal

28. If in a broadcasting studio, a 1000 kHz carrier is modulated by an audio signal of frequency range 100-5000 kHz, the width of channel is:

(1) 5 kHz

(2) 4.9 kHz

(3) 995 kHz

(4) 10 kHz

29. The bit rate of the digital communication system is MKBPS. The modulation used is 16 QAM. The minimum bandwidth required for ideal transmission is:

(1) M/2 kHz

(2) M/16 kHz

(3) MHz

(4) M/8 kHz

30. The noise performance of a square low demodulator of AM signal is:

(1) better than that of an envelope detector

(2) better than that of a synchronous detector

(3) identical than that of a synchronous detector

(4) poorer than that of envelope detector

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- 21. Fermi level for intrinsic semiconductor lies:
 - (1) At middle of the band gap
- (2) Close to conduction band
- (3) Close to valence band
- (4) None
- 32. Consider the transistor shown in Fig. 1:

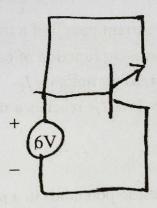


Fig. 1

The transistor is operating in:

- (1) Forward-Active region
- (2) Reverse-Active region

(3) Saturation region

- (4) Cut off region
- 33. The electron concentration in silicon decreases linearly from 10¹⁶ cm⁻³ to 10¹⁵ cm⁻³ over a distance of 0.10 cm. The cross-sectional area of sample is 0.05 cm². The electron diffusion coefficient, D_n is given by 25 cm²/sec. The diffusion current in silicon will be:
 - (1) 0.36 mA
- (2) 3.6 mA
- (3) 0.18 mA
- (4) 18 mA
- 34. A silicon p⁺n junction has doping concentration of $N_a = 10^{18}$ cm⁻³ and $N_d = 5 \times 10^{15}$ cm⁻³. The cross-sectional area of the junction is $A = 5 \times 10^{-5}$ cm², what will be the capacitance for the applied reverse voltage, $V_R = 3 \text{ V}$?
 - (1) 0.521 pF
- (2) 0.005 nF
- (3) 1.04 nF
- (4) 2.61 nF
- 35. Consider on MOS structure with p-type silicon and $N_a = 6 \times 10^{15}$ cm⁻³. If the gate is aluminium then the metal semiconductor work function difference, ϕ_{ms} of the MOS structure will be:
 - (1) -2.256 V
- (2) -0.944 V
- (3) 7.344 V
- (4) 4.144 V

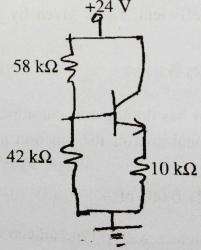
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P. T. O.

- D
- The phenomenon known as "Early Effect" in a bipolar transistor refers to a reduction of 36. base-width caused by:
 - (1) Electron-hole recombination base
 - (2) The forward biasing of emitter-base junction
 - (3) The early removal of stored base charge during saturation to cut-off region
 - (4) The reverse biasing of base-collector junction
- The common short circuit current gain β of a transistor :
 - (1) is a monotonically increasing function of collector current I_C
 - (2) is a monotonically decreasing function I_C
 - (3) increasing with I_C , for low I_C reaches a maximum and then decrease with further increase in I_C
 - (4) is not a function of I_C
- The built-in-potential (diffusion potential) in a pn-junction: 38.
 - (i) increases with increase in temperature
 - (ii) increases with increase in doping in the dioping levels of two sides
 - (iii) is equal to the average of the Fermi levels of two sides
 - (iv) is equal to the difference of the Fermi levels of two sides

Which of the following statement is correct?

- (1) (i), (ii) & (iv) (2) (i) & (ii)
- (3) (ii) & (iii)
- (4) (i) & (iv)
- The current gain of the transistor as shown in Fig. 2 is $\beta = 125$. The Q-point values $(I_{CO} & V_{CEO})$ are:



(1) 0.418 mA & 20.4 V

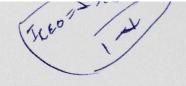
(3) 0.913 mA & 14.8 V

Fig. 2

(2) 0.913 mA & 16.23 V

(4) 0.418 mA & 18.43 mV

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D

- The collector to emitter cut-off current (I_{CEO}) to base cut-off current (I_{CBO}) is 40. as α is the CB current gain of transistor:
 - $(1) I_{CEO} = I_{CBO}$

 $(2) I_{CEO} = \alpha I_{CBO}$

 $(3) I_{CEO} = \frac{I_{CBO}}{1 + \alpha}$

- $(A) I_{CEO} = \frac{I_{CBO}}{1-\alpha}$
- 41. When the memory or I/O device is not able to respond quickly, wait states (Tw) are inserted between by the READY input of the 8086.
 - (1) $T_3 \& T_4$ disabling

(2) $T_2 \& T_3$ disabling

- (3) $T_1 & T_2$ enabling (4) $T_3 & T_4$ enabling
- AL, AX and DX registers of 8086 are used in following instructions: 42.
 - (1) Multiply, Divide, I/O and Translate
 - (2) Multiply, Divide, I/O and Decimal adjustments
 - (3) Multiply, Divide, I/O, Translate and Decimal adjustments
 - (4) Multiply, Divide and I/O
- If [BX] = 1234 H, [BP] = 2490 H, AX = 1000 H, LIST = 5980 H, CS = 3000 H, DS = 2000 H, ES = 5000 H and SS = 6000 H. The effective and physical address of MOV LIST [BP], AX is given by:
 - (1) 8E10, 28E10
- (2) 8E10, 68E10
- (3) 7E10, 27E10
- (4) 7E10, 67E10
- If CF = 1, AX = 1F89H, what are the contents of AX and CF after the execution of 011/11/1 o 111 110 1101 011 0 following instructions? MOV CL, 2

RCL AX, CL

- (1) AX = 2A6BH & CF = 1
- (2) AX = 7EA6H & CF = 0
- (3) AX = 7FB7H & CF = 0
- (4) AX = 0F89H & CF = 1



45.	Why is CHMOS technology preferred over HMOS technology for designing devices of
	MCS-51 family ?
	(1) Due to higher noise immunity
	(2) Due to lower power consumption
	(3) Due to higher speed
	(4) All of the above
46.	Which is the only register without internal on-chip RAM address in MCS-51?
	(1) Stack pointer (2) Program counter
	(3) Data printer (4) Timer register
47.	Which among the below mentioned functions does <i>not</i> belong to the category of alternate functions performed by Port-3 (Pins 10-17)?
	(1) Read/write control signals (2) Serial ports
	(3) Internal interrupts (4) External interrupts
48.	How many single byte, two byte and three byte instructions are supported by MCS-51
	for overall instruction sent?
	(1) 45 single byte, 45 two bytes and 17 three bytes
* 4.00	(2) 45 single byte, 45 two bytes and 15 three bytes
	(3) 55 single byte, 40 two bytes and 20 three bytes
	(4) 40 single byte, 55 two bytes and 17 three bytes
19.	Which rotate instructions has an ability to modify CY flag by moving the bit-7 & bit-0

(2) RRC & RLC (3) RR & RLC (4) RL & RLC

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respectively to accumulator?

(1) RR & RL

56.	A multimode step index fiber has so dispersion parameter for fiber is 150 psr	urce nm ⁻¹	of RMS spectral width of 60 nm a lkm ⁻¹ . Estimate rms pulse broadening d	nd lue
	to material dispersion:			
	(1) 12.5 ns km^{-1} (2) 9.6 ns km^{-1}			
57.	A compared to planar LED structure efficiency effective emission are	, Do	ome LEDs have external pov d radiance.	ver
	(1) greater, lesser, reduced	(2)	higher, greater, reduced	
	(3) higher, lesser, increased	(4)	greater, greater, increased	
58.	The wavelength of RAPD with 70% eff by:	ficier	ncy and responsibility 0.689 A/W is given	ven
	(1) 06 μm (2) 7.21 μm	(3)	0.112 μm (4) 03 μm	
59.	An RC Snubber circuit is used to protect	t a th	ysistor against :	
	(1) false triggering	(2)	failure to turn on	
	(3) switching transiants	(4)	failure to commutate	
60.	What is the backup duration for 600 VA	UPS	S ?	
	(1) 30 to 45 minutes	(2)	15 to 20 minutes	
	(3) 01 to 05 minutes	(4)	05 to 10 minutes	
61.	A network is said to be linear if and only	y if:		
	(1) the response is proportional to the ex	xcita	ation function	
	(2) the principle of superposition applie	es		
	(3) the principle of homogeneity applie	S		
	(4) both (2) and (3)			

- A battery charger can drive a current of 5 A into 1 Ω resistance connected at its output terminals. If it is able to charge an ideal 2 V battery at 7 A rate, then its Thevenin's equivalent will be:
 - (1) 7.5 V in series with 0.5 Ω
 - (2) 12.5 V in series with 1.5 Ω
 - (3) 7.5 V in parallel with 0.5 Ω
 - (4) 1.25 V in parallel with 1.5 Ω
- In a given circuit as shown in Fig. 6, if the power dissipated in 6 Ω resistor is zero, the Vis:

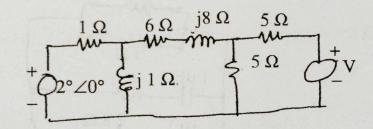


Fig. 6

- (1) $20\sqrt{2} \angle 45^{\circ}$ (2) $20 \angle 30^{\circ}$
- (3) $20 \angle 45^{\circ}$ (4) $20\sqrt{2} \angle 30^{\circ}$
- **64.** Y parameters of a four terminal block are $\begin{bmatrix} 4 & 2 \\ 1 & 1 \end{bmatrix}$. A single element of 1 Ω is connected acoss as shown in Fig. 7. The new Y-parametes will be:

$$\begin{array}{c|c}
1 & 2 \\
1 & 1
\end{array}$$

$$(1)\begin{bmatrix} 4 & 3 \\ 2 & 2 \end{bmatrix}$$

(1)
$$\begin{bmatrix} 4 & 3 \\ 2 & 2 \end{bmatrix}$$
 (2)
$$\begin{bmatrix} 4 & 2 \\ 1 & 1 \end{bmatrix}$$
 (3)
$$\begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$$
 (4)
$$\begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix}$$

Fig. 7
$$(3) \begin{bmatrix} 5 & 1 \\ 0 & 2 \end{bmatrix}$$

$$(4)\begin{bmatrix}3 & 2\\1 & 2\end{bmatrix}$$

In the given circuit as shown in Fig. 8, the switch was closed for a long time before opening at t = 0. The voltage v_x at $t = 0^+$ is:

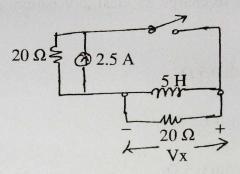


Fig. 8

- (1) 25 V
- (2) 50 V
- (3) -50 V
- (4) 0 V
- What is the steady state current in 2 Ω resistor as shown Fig. 9? Internal resistance of the battery is negligible and value of the capacitance C is 0.2 μF :

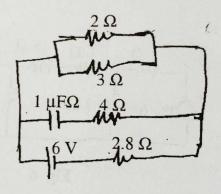


Fig. 9

- (1) 1.5 A
- (2) 1.2 A
- (3) 0.6 A
- (4) 0.9 A

- Fourier Transform of $-a^n u(-n-1)$ is:

- (1) $\frac{1}{1+ja\omega}$ (2) $\frac{1}{1-ja\omega}$ (3) $\frac{1}{1+ae^{-j\omega}}$ (4) $\frac{1}{1-ae^{j\omega}}$
- The number of complex multiplications and complex additions involved in the direct 68.
 - (1) 64 & 56
- (2) 8 & 16
- (3) 64 & 64
- (4) 64 & 8

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7

73.

D

Non-linearity in the relationship between Ω and ω is known as :

(1) aliasing

(2) frequency warping

(3) unwarping

(4) frequency mixing

For rectangular window, the peak side lobe magnitude in dB is:

- $(1) -58 \, dB$
- (2) -41 dB (3) -31 dB
- (4) 13 dB

The abrupt truncation of Fourier series results in oscillations in:

- (1) both pass band & stop band
- (2) only pass band

(3) only stop band

(4) none of these

The trigonometric Fourier series representation of a function with half wave symmetry consists of:

(1) even hormonics

(2) old hormonics

(3) sine terms only

(4) cosine terms only

The circuit as shown in Fig. 10 converts a binary code Y_1 Y_2 Y_3 into : 73.

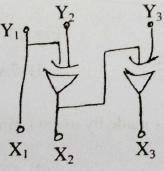


Fig. 10

(1) Hamming code

(2) BCD code

(3) Gray code

(4) Excess 3-code

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74. The circuit in Fig. 11 produces the output sequence:

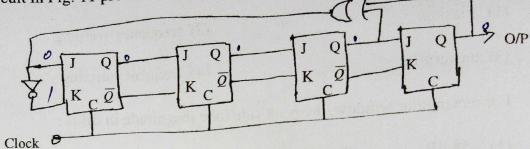


Fig. 11

(1) 1111	1111	0000	0000
(2) 1111	0000	1111	0000
(3) 1111	0001	0011	0100
(4) 1010	1010	1010	1010

75. If initially register contains byte B7H, then after 04 clock pulses, the contents of register will be shown in Fig. 12:

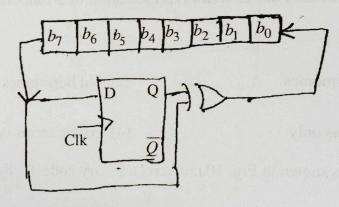


Fig. 12

(1) 7C

(2) 7E

(3) 7A

(4) 74

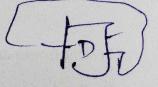
76. A switch-tail ring counter is made by using a single D-FF. The resulting circuit is:

(1) SR Flip-flop

(2) JK Flip-flop

(3) D-FF

(4) T-FF



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D

77.	A pulse train can be delayed by a finite number periods usings of clock:
	(1) a seriel-in-serial shift register
	(2) a serial-in-parallel-out shift register
	(3) a parallel-in-serial-out shift register
	(4) a serial-in-parallel-out shift register
78.	Dual slope integration type analog to digital converters provide:
	(1) higher speeds compared to all other types of A/D conveters(2) poor rejection of power supply hum
	(3) better resolution compared to all other types of A/D converters for the same number of bits
	(4) very good accuracy without putting extreme requirements on component stability
79.	In a 4-bit weighted resistor D/A converter, the resister value corresponding to MSB will be:
	(1) $4 k\Omega$ (2) $8 k\Omega$ (3) $16 k\Omega$ (4) $32 k\Omega$
80.	An 8-bit digital ramp ADC with a 40 mV resolution uses a clock frequency of 2.5 MHz and a comparator with $V_T = 1$ mV. The digital output for $V_A = 6.000$ V is:
	(1) 1011111 (2) 1011110 (3) 10010111 (4) 10010110
81.	In the fabrication of monolithic ICs, Boron chloride is added as an impurity in the diffusion process. Find the diffusion time, if the furnance is heated upto 1200°C.
	(1) 01 hour (2) 02 hours (3) 35 minutes (4) 20 minutes
82.	How the aluminium film coating is carried out in metalization process?
	(1) Heating and Pouring aluminium in required place
	(2) Placing the aluminium in required place and then heating it using tungsten

(3) Aluminium is vaccum evaporated and then condensed

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(4) None of the mentioned

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83	3. The burried la	ayer reduces collector	series resistance by pr	oviding:	
	(1) A low res	sistivity current path from	om n-type layer to n+	contact layer	
	(2) A low res	sistivity current path fro	om p-type layer to n+	contact layer	
		sistivity current path for			
		sistivity current path from			
84	. The carrier de	nsity in the channel in	the constant voltage	model is scaled as:	
	(1) 1/β		(2) 1		
	(3) β		(4) All of the m	nentioned	
85.	The parameter	r which is <i>not</i> scaled to	any factor is:		
	(1) Power spe	eed product	(2) Switching e	energy	
	(3) Channel re	esistance	(4) All of the m	nentioned	
86.	A digital CMC	OS IC operating at 15 l	MHz clock frequency	consumes 130 mW, the	same
				mW power. The static p	
	consumption o	of the IC is:			
	(1) 20 mW	(2) 40 mW	(3) 50 mW	(4) 90 mW	
87.	What should be	e the width of metal 1	and metal 2 layers?		
	(1) 3λ, 3λ	(2) 2λ, 3λ	(3) 2λ, 4λ	(4) 3λ, 4λ	
88.	outside.	ure used in thick and	d thin film ICs, as	individual components	fron
	(1) Transistors		(2) Active elem	nents	
	(3) Diode		•(4) All of the n		
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89	- Could Call be achieved in two wave either using on b
	using water vapour for growing thicker oxides?
	(1) dry oxidation can be used (2) wet oxidations can be used
	(3) any of dry & wet can be used (4) dry oxidation followed by wet oxidation
90.	If P is development, Q is etching, R is alignment & exposure and S is photoresis stripping then the order in which they are carried out in a standard photolithograph process is:
	(1) P-Q-R-S (2) Q-P-S-R (3) P-S-R-Q (4) R-P-Q-S
91.	Which of the following options about tunnel diodes is incorrect?
	(1) The width of depletion region is high as compared to the p-n junction.
	(2) Impurity concentration is high as compared to p-n junction.
	(3) The V-I characteristics show the negative resistance region.
	(4) Carrier velocities are very high.
92.	The following structures are used in High Electron Mobility Transistor:
	(1) Diffusion & self aligned ion implanted structure
	(2) Recess gate structure
	(3) Self aligned ion implented structure & recess gate structure
	(4) Diffusion & recess gate structure
	Preliminary filtration is one of the steps used in the liquid phase purification method of
	CNT. What is its purpose?
	(1) To remove bulk solid particles (2) To remove bulk graphite particles
	(3) To remove fullerences and catalysts (4) To isolate MWCNT
	By nano scale distribution of the in matrix improves the life and
	performance. (1) Carbide (2) Hydrides (3) Tungesten (4) Nitrides
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95	Solar cell is made from bulk materials t	hat is cut into water of thickness.
	(1) 120-180 μm (2) 120-220 μm	(3) 180-220 μm (4) 180-240 μm
96	An LCD requires a power of display system.	to light up are segment of a seven segment
	(1) 20 µm (2) 10 mW	(3) 10 nW (4) $02 \mu\text{W}$
97.	An abrupt silicon pn-junction has dop $Nd = 2 \times 10^{15} \text{ cm}^{-3}$ at $T = 300 \text{ K}$. A re- junction. What will be the maximum ele	
	(1) $3.23 \times 10^5 \text{ V/cm}$ (3) $7.0 \times 10^4 \text{ V/cm}$	(2) $3.5 \times 10^4 \text{ V/cm}$ (4) $6.45 \times 10^5 \text{ V/cm}$
98.	The impurity level in an extrinsic semic	onductor about of pure semiconductor.
	(1) 10 atoms for 108 atoms	(2) 1 atom for 108 atoms
	(3) 1 atom for 104 atoms	(4) 1 atom for 100 atoms
99.	When the temperature of an extrinsic effect is on	semiconductor is increased, the pronounced
	(X) Minority carriers	(2) Majority carriers
	(3) Minority & Majority carriers	(4) Junction capacitance
00.		ty of electrons in intrinsic semiconductors. (3) Less than (4) Cannot define

Q. NO.	Α	В	C	D
1	2	4	3	4
2	3	2	2	1
3	1	1	4	2
4	4	3	1	3
5	3	3	2	2
6				+
	2	4	4	4
7	4	3	3	3
8	1	1	1	2
9	2	2	3	1
10	4	4	4	1
11	1	3	1	2
12	3	1	2	1
13	2	3	3	1
14	3	1	1	4
15	4	3	2	3
16	1	4	4	2
17	3	2	1	4
18	2	4	4	3
19	1	1	2	1
20	4	2	3	2
21	3	4	2	3
22	2	1	1	1
23	4	2	4	3
24	1	3	1	1
25	2	2	4	3
26	4	4	3	4
27	3	3	2	2
28	1	2	3	4
29	3	1	3	1
30	4	1	2	2
31	2	2	3	3
32	1	3	1	2
33	1	1	3	
34	4	4	1	4
35	3	3		1
36	2		3	2
		2	4	4
37	4	4	2	3
38	3	1	4	1
39	1	2	1	3
40	2	4	2	4
41	4	1	1	1
42	2	2	3	3
43	1 *	3	2	4
44	3	1	3	2
45	3	2	4	4
46	4	4	1	2
47	3	1	3	3
48	_ 1	4	2	1
49	2	2	1	2
50	4	3	4	4

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Q. NO.	wer keys of PHD-EE-2 A	В	С	D
51	1	1	2	2
52	2	3	1	1
53	3	4	1	4
54	1	2	4	1
55	2	4	3	4
56	4	2	2	3
57	1	3	4	2
58	4	1	3	3
59	2	2		3
60	3		1	
61		4	2	2
	1	3	2	4
62	3	2	3	2
63	4	4	1	1
64	2	1	4	3
65	4	2	3	3
66	2	4	2	4
67	3	3	4	3
68	1	1	1	1
69	2	3	2	2
70	4	4	4	4
71	3	1	4	1
72	1	3	2	2
73	3	2	1	3
74	1	3	3	1
75	3	4	3	2
76	4	1	4	4
77	2	3	3	1
78	4	2	1	4
79	1	1	2	2
80	2	4	4	3
81	2	2	4	2
82	1	1	1	3
83	4	4	2	1
84	1	1	3	4
85	4	4	2	3
86	3	3	4	2
87	2	2	3	4
88	3	3	2	1
89	3	3	1	2
90	2	2	1	4
91	4	2	1	1
92	1	1	3	3
93	2	1	4	2
94	3	4	2	3
95	2	3	4	4
96	Λ	2	2	1
97	3	4	3	3
98	2	3	1	2
99	1	1	2	
100	1	2	4	1

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