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(M.Phil/Ph.D/URS–EE–2018)

Code A

Electronics & Communication Engineering

Sr. No. 100001

Time : 1¼ Hours **Max. Marks : 100** **Total Questions : 100**

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

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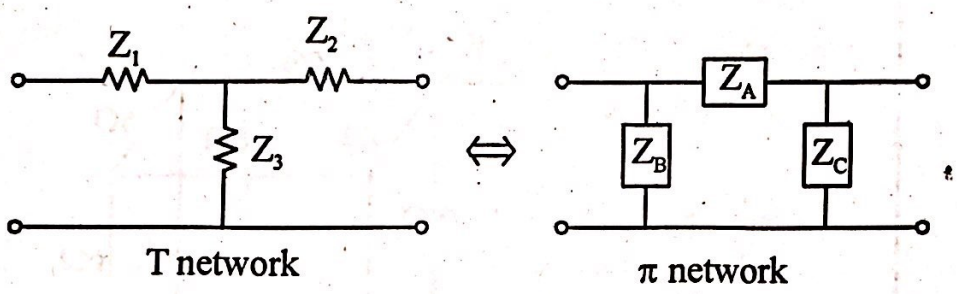
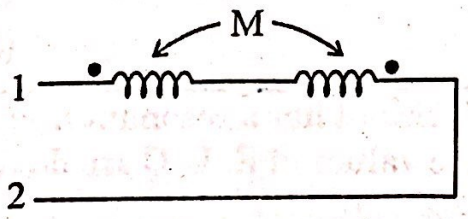
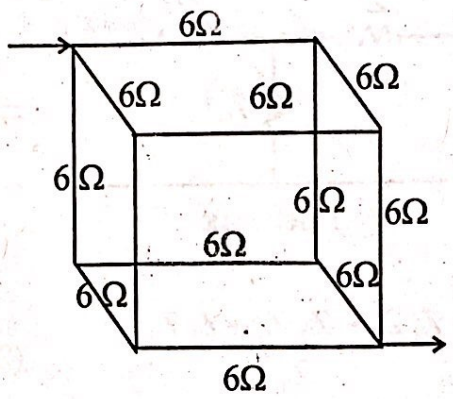
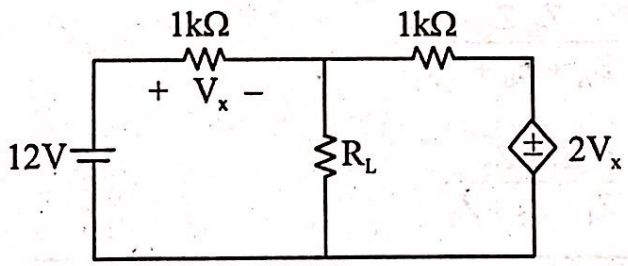
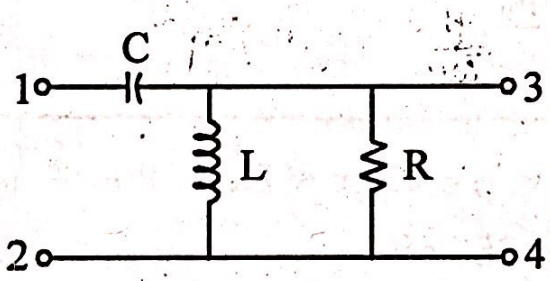
(Signature of the candidate) (Signature of the Invigilator)

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

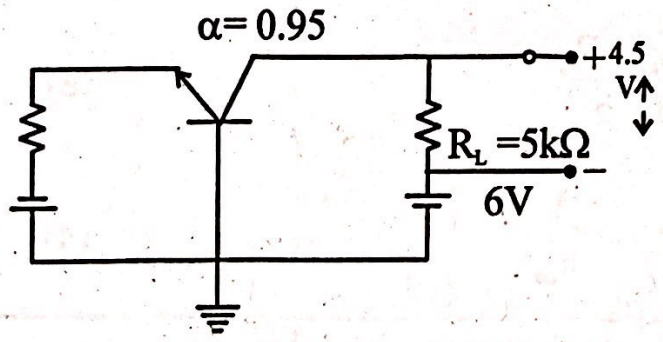
1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / mis-behaviour will be registered against him / her, in addition to lodging of 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 will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet / Answer Key, the same may be brought to the notice of the Controller of Examination in writing / through E.Mail within 24 hours of uploading the same on the University Website. 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 book-let itself. Answers MUST NOT be ticked in the Question book-let.
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 BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

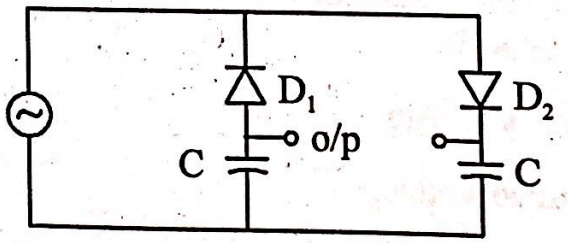
Question No.	Questions
1.	T to π transformation gives the value of $Z_C \Rightarrow$  T network ⟺ π network (1) $\left(Z_C = \frac{Z_1 Z_2 + Z_2 Z_3 + Z_1 Z_3}{Z_1}\right)$ (2) $Z_C = \frac{Z_A Z_B}{Z_A + Z_B + Z_C}$ (3) $Z_C = \frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_A Z_C + Z_B Z_C}$ (4) $Z_C = \frac{Z_1 Z_2 Z_3}{Z_1 + Z_2 + Z_3}$
2.	In the above question π to T conversion gives the value of Z_1 (1) $\frac{Z_B Z_C}{Z_A + Z_B + Z_C}$ (2) $\frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_B Z_C + Z_C Z_A}$ (3) $\frac{Z_1 + Z_2}{Z_1 + Z_2 + Z_3}$ (4) $\frac{Z_A Z_B}{Z_A + Z_B + Z_C}$
3.	The equivalent inductance of the following is given by  (1) $L_1 + L_2 + M$ (2) $L_1 + L_2 - M$ (3) $L_1 + L_2 + 2M$ (4) $L_1 + L_2 - 2M$

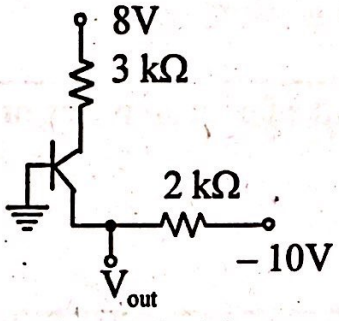
Question No.	Questions
4.	Every arm of the cube has a resistance of 6 ohms. The equivalent resistance of the cube is given by  (1) 36 Ω (2) 12 Ω (3) 10 Ω (4) 5 Ω
5.	In the following circuit, the value of R_L is given by  (1) 0.5 kΩ (2) 250 Ω (3) 1 kΩ (4) 2k Ω
6.	Series RLC circuit has a resonant frequency of 1 MHz and a quality factor of 100, if the values of R, L, C are doubled, what is the new value of Q ? (1) 25 (2) 50 (3) 100 (4) 200

Question No.	Questions
7.	In a series RLC circuit R = 2kΩ, L = 1H, C = $\frac{1}{400}$ μF, The resonant frequency is (1) 2×10^4 Hz (2) $\frac{10^4}{\pi}$ Hz (3) 10 kHz (4) 20π kHz
8.	For a 2-port network to be reciprocal, following is true (1) $Z_{11} = Z_{22}$ and $Y_{11} = Y_{22}$ (2) $Y_{21} = Y_{12}$ & $h_{21} = -h_{12}$ (3) $AD - BC = 0$ (4) $AB - CD = 0$
9.	The network shown behaves like a  (1) High pass filter (2) LPF (3) BPF (4) Band stop filter
10.	If the scattering matrix [S] of a two port network is $[S] = \begin{bmatrix} 0.2\angle 0° & 0.9\angle 90° \\ 0.9\angle 90° & 0.1\angle 90° \end{bmatrix}$ then the network is (1) lossless and reciprocal (2) lossless but non reciprocal (3) lossy but reciprocal (4) neither lossy nor reciprocal
11.	Current density in a semiconductor material is given by (1) $J = n \mu_n q/E$ (2) $J = p \mu p q/E$ (3) $J = (n \mu_n + p \mu p) . E$ (4) $J = (n \mu_n + p \mu p) / E$

Question No.	Questions
12.	Fermi Level for a P-type semiconductor is given by (1) $E_F = E_V - KT\, ln \frac{N_A}{N_V}$ (2) $E_F = -E_V + KT\, ln \frac{N_A}{N_V}$ (3) $E_F = E_V - K_T\, ln \frac{N_A}{N_V}$ (4) $E_F = E_C - K_T\, ln \frac{N_C}{N_D}$
13.	For conductors the value of Hall coefficient is given by (1) $R_H = \frac{1}{nq}$ (2) $R_H = \frac{nq}{\mu_n}$ (3) $R_H = \frac{\mu_p}{nq}$ (4) $R_H = \frac{n\mu_n + p\mu_p}{q}$
14.	The band gap energy of Ge at 300 $\overset{\circ}{K}$ is given by (1) $E_g = 0.785$ eV (2) $E_g = 1.121$ eV (3) $E_g = 0.7181$ eV (4) $E_g = 1.212$ eV
15.	Under low level injection assumption, the injected minority current for an extrinsic semiconductor is essentially the (1) Diffusion current (2) Drift current (3) Recombination current (4) Induction current
16.	Ga As has band gap energy of the order of (1) 1.43 eV (2) 0.7 eV (3) 2.4 eV (4) 1.6 eV
17.	Typical value of impurity concentration in a tunnel diode is (1) 1 part in 10^8 parts (2) 1 part in 10^3 parts (3) 1 PPM (4) 1 part in 10 parts

Question No.	Questions
18.	In the given circuit, the value of collector current is :  (1) 0.8 mA (2) 0.9 mA (3) 0.947 mA (4) 0.847 A
19.	MOSFET can be used as a (1) Current controlled capacitor (2) Voltage controlled capacitor (3) Current controlled inductor (4) Voltage controlled inductor
20.	The effective channel length of a MOSFET in saturation decreases with the increase in (1) Gate voltage (2) Drain voltage (3) Source voltage (4) Body voltage
21.	For a common base BJT, having I_e = 5 mA and α = 0.97 an AC signal of 5 mV is applied between the base and the emitter terminals. The input impedance is given by (1) 5.2 Ω (2) 6 Ω (3) 4.9 Ω (4) 6.7 Ω
22.	The typical value of h_f for common base BJT is (1) 50 – 250 (2) – 50 (3) – 1 (4) 25

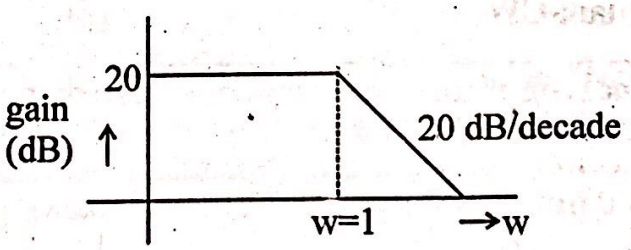
Question No.	Questions
23.	If the source resistance, the output resistance of emitter follower using the simplified hybrid model would be (1) $\frac{h_{ie}+R_s}{1+h_{fe}}$ (2) $\frac{h_{ie}+R_s}{h_{fe}}$ (3) $R_S+\frac{1}{h_{oe}}$ (4) $\frac{1}{h_{oe}}$
24.	The ripple factor is given by (1) $\sqrt{\left(\frac{I_{rms}}{I_{dc}}\right)^2-1}$ (2) $\left(1-\sqrt{\frac{I_{rms}}{I_d}}\right)^2$ (3) $\frac{I_{rms}}{I_{dc}}$ (4) $\frac{I_{dc}}{I_{rms}}$
25.	Following circuits is given by :  (1) Bridge rectifier (2) Ring modulator (3) Frequency discriminator (4) Voltage doubler.
26.	For a transistor amplifier to be inherently stable against thermal run away, the condition is (1) $V_{CE}>\frac{V_{CC}}{2}$ (2) $V_{CE}<\frac{V_{CC}}{2}$ (3) $V_{CE}=\frac{V_{CC}}{2}$ (4) $V_{CE}=1.5\,V_{CC}$

Question No.	Questions
27.	For the circuit given the value of V_{out} is :  (V_{BE} = 0.7V) (1) +5.14 V (2) –6.14 V (3) –5.14 V (4) +6.14 V
28.	The gain of a transistor amplifier falls at high frequency due to the (1) internal capacitance of the device (2) coupling capacitor at the input (3) skin effect (4) coupling capacitor at the output
29.	The effect of negative feedback on Noise is (1) $\frac{N}{1-\beta A}$ (2) $N(1-\beta A)$ (3) $N(1+\beta A)$ (4) $\frac{N}{1+\beta A}$
30.	Cross-over distortion behaviour is a characteristics of (1) Class – A output stage (2) Class – B output stage (3) Class – AB output stage (4) Common base output stage

Question No.	Questions
31.	The octal equivalent of Hexadecimal number 2E.C1 would be (1) 212.602 (2) 56.602 (3) 56.623 (4) 65.302
32.	The complement of complement of $\overline{A}B + A\overline{B}$ will be (1) $AB + \overline{A}\overline{B}$ (2) $\overline{A}B$ (3) $\overline{A}B + A\overline{B}$ (4) $\overline{A}B.(\overline{A} + B)$
33.	What is minimum number of 2-input NAND gates required to complement a 2-input OR gate (1) 2 (2) 4 (3) 3 (4) 5
34.	A basic CMOS two input NAND gate requires (1) Two N-channel MOSFETs (2) Two N-Channel & two P-channel MOSFETs (3) Two P-Channel MOSFETs (4) One N-Channel and one P-channel MOSFET
35.	IC 7402 is a – 2 input (1) NAND gate (2) EX-OR gate (3) NOR gate (4) OR Gate
36.	A decoder is nothing but a DEMUX without (1) control inputs (2) data input (3) enable input (4) clock
37.	The size of a PROM needed to implement a dual 8 to 1 MUX with common selection inputs would be (1) 256 K × 2 (2) 512 K × 2 (3) 1024 K × 2 (4) 128 K × 2

Question No.	Questions
38.	Which one of following is not a synchronous input with reference to a flip flop (1) J input in JK flip flop (2) R input in RS flip flop (3) Preset input in JK flip flop (4) D-input in a D flip flop
39.	A counter having a modulus of 64 should have a minimum of (1) Six flip flops (2) Seven flip flops (3) 5 – D – flip flops (4) 64 flip flops
40.	A logic circuit that gives a pulsed waveform at the output for a sinusoidal input (1) Bi stable multivibrator (2) Monostable multivibrator (3) Astable multivibrator (4) Schmitt trigger
41.	Poisson's equation is given by (1) $\nabla .D = 0$ (2) $\nabla^2 V = 0$ (3) $\nabla^2 V = -\frac{\rho}{\epsilon}$ (4) $\nabla^2 V = \rho/\epsilon_0$
42.	The total flux of a closed surface is equal to the net charge enclosed within the surface. This statement is an expression of (1) Divergence Theorem (2) Gauss's Law (3) Faraday Law (4) Maxwells equations
43.	The divergence of a vector $\overline{A} = x\,\hat{a}x + y\,\hat{a}y + z\,\hat{a}z$ is (1) 0 (2) $1/3$ (3) 1 (4) 3
44.	Which of the following expression is true for a perfect dielectric (1) $\sigma >> w\epsilon$ (2) $\sigma = w\epsilon$ (3) $\sigma << w\epsilon$ (4) $\sigma = \sqrt{w\epsilon}$

Question No.	Questions
45.	Given that $\sigma = 38$ m S/m & $\mu_r = 1$ for aluminium, the skin depth at a frequency of 2 MHz would be equal to (1) 64.5 nm (2) 64.5 μm (3) 57.7 nm (4) 57.77 μm
46.	The power density of solar radiation at a place is 1.2 kW/m^2. The approximate value of electric field corresponding to the incident solar power is given by (1) 950 V/m (2) 750 V/m (3) 450 V/m (4) 475 V/m
47.	A plane wave in air impinges at 45° on a loss less dielectric. The transmitted wave propagates at an angle 30° with respect to the normal. The value of dielectric constant of the dielectric is (1) 2.5 (2) 2.0 (3) 3.0 (4) 4.0
48.	A plane wave travelling in a free space is incident normally on a medium having $\epsilon_r = 4.0$. The fraction of power transmitted in to the medium is given by (1) $8/9$ (2) $1/2$ (3) $1/3$ (4) $5/6$
49.	A metallic waveguide can be considered as a (1) low pass filter (2) high pass filter (3) band pass filter (4) band reject filter
50.	A 10 GHz wave is propagating in a waveguide having a wall separation of 4 cm. The largest number of half waves of electric intensity possible in the waveguide is (1) 1 (2) 3 (3) 2 (4) 4

Question No.	Questions
51.	The open loop transfer function of a certain control system is given by $GH = \frac{K}{(S+2)^3}$ for $K > 0$. For what value of gain factor, K, will the root locus of the control system cross the jw-axis. (1) 8 (2) 14 (3) 24 (4) 64
52.	For the above question, the value of the damping factor ξ for a design value of gain factor equal to 8 ? (1) 0.5 (2) 0.3 (3) 0.707 (4) 0.866
53.	A system has 14 poles and 2-zeroes. Its high frequency asymptote in its magnitude plot will have a slope of (1) – 40 dB/decade (2) – 240 dB/decade (3) – 280 dB/decade (4) – 320 dB/decade
54.	Bode plot of a stable system is shown in the following figure. The transfer function of the system is :  (1) $\frac{1}{(S+1)}$ (2) $10/(S+1)$ (3) $\frac{1}{S(S+1)}$ (4) $\frac{10}{s(s+1)}$

Question No.	Questions
55.	The state transition matrix represents (1) Forced response of the system (2) Free response of the system (3) Transient response of the system (4) None of these
56.	The attenuation of the optical fiber is of the order of (1) 0.01 dB/K_m (2) 0.2 dB/K_m (3) 20 dB/K_m (4) – 40 dB/K_m
57.	The operating frequency corresponding to 1550 nm is (1) 193 THz (2) 19.3 THz (3) 100 THz (4) 300 THz
58.	Which of the following operational mode is likely to produce the shortest pulse width (1) Q-switched (2) Cavity dumped (3) Quasi-CW (4) Mode Locked
59.	In optical communication systems, zero dispersion wavelength is operating at (1) 800 nm (2) 1330 nm (3) 1550 nm (4) 1630 nm
60.	In DWDM technology, the separation between the adjacent channels is of the order of (1) 4 – 6 nm (2) 0.8 nm (3) 0.1 nm (4) 8–10 nm

Question No.	Questions
61.	The region of convergence of z-transform of the sequence $\left[\frac{5}{6}\right]^n u(n) - \left[\frac{6}{5}\right]^n u(-n-1)$ is (1) $\|z\| < 5/6$ (2) $\|z\| > 5/6$ (3) $\frac{5}{6} < \|z\| < \frac{6}{5}$ (4) $\frac{6}{5} < \|z\| < \infty$
62.	The power saving in case of SSB/SC signal as compared to a standard AM signal for modulation index = 0.5 is (1) 94.4 % (2) 23.2 % (3) 56.7 % (4) 75 %
63.	Which of the following suffer (s) from the threshold effect (1) AM detection using envelope detection (2) AM detection using synchronous detection (3) FM detection using a discriminator (4) SSB detection with synchronous detection
64.	A sinusoidal wave of amplitude 10 V and frequency 1kHz is applied to an FM generator having a frequency sensitivity constant of 40 Hz/V, the frequency deviation is (1) 100 Hz (2) 200 Hz (3) 400 Hz (4) 500 Hz
65.	In a VSB system, modulating frequency of 3 MHz results in a sideband power of 25 W. If the carrier power is 100 W, the depth of modulation is (1) 25% (2) 50% (3) 75% (4) 100%

Question No.	Questions
66.	An FM signal is represented by $v(t) = 15 \cos [10^8 \pi t + 6 \sin 2\pi \times 10^3 t]$. The maximum phase deviation in radians are (1) 5 (2) 8 (3) 6 (4) 9
67.	PLL can be used to demodulate (1) PAM signals (2) FM signals (3) PCM (4) DSBSC
68.	PAM signals can be detected by using (1) ADC (2) Integrator (3) Band pass filter (4) High pass filter
69.	The input to a coherent de ector is DSBSC signal plus Noise, the noise at the detector output is given by (1) In phase component (2) Quadrature component (3) Zero (4) Envelope
70.	A Hilbert transformer is a (1) Non linear system (2) Non-causal system (3) Time-varying system (4) Low pass system
71.	The Nyquist rate for message signal given by $m(t) = 10 \cos 10^3 \pi t \cdot \cos 4 \times 10^3 \pi t$ is (1) 10 kHz (2) 2.5 kHz (3) 5 kHz (4) 2 kHz
72.	Compression in PCM refers to relative compression of (1) Lower signal amplitudes (2) Higher signal amplitudes (3) Lower signal frequencies (4) Higher signal frequencies

Question No.	Questions
73.	For a bit rate of 8 kbps, the best possible values of the transmitted frequencies in a coherent binary FSK system are (1) 16 kHz and 20 kHz (2) 20 kHz and 32 kHz (3) 20 kHz and 40 kHz (4) 32 kHz and 40 kHz
74.	Which function displays a string of text and append a new line character at its end ? (1) putchar ( ) (2) printf ( ) (3) puts ( ) (4) put ( )
75.	What will be output of the following code if i = 10 and a[10] = 20 ; a [i] = i ++ ; (1) a [10] will be 10 (2) a [11] will be 11 (3) a [11] will be 10 (4) None of the above

76.	Following statement is given
	a = 0;
	b = (a = 0) ? 2 : 3;
	What will be the value of b
	(1) 2 (2) 3
	(3) 0 (4) 1

77.	Find the output for the following C program : main ( ) {int x = 2, y = 6, z = 6; x = y = = z ; printf (" % d", x) (1) 1 (2) 2 (3) 6 (4) 8

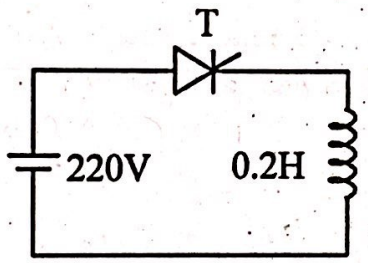
Question No.	Questions
78.	The data type of the controlling statement of a switch statement can not be of the type : (1) int (2) char (3) short (4) float

79.	main ( ) {
	Char a [ ] = "Hello world" ;
	print f (" % s", a + 1) ;
	}
	What is the output of above 'C' program
	(1) Compilation Error (2) Garbage Output
	(3) ello World (4) hello world

80.	FORTRAN is a (1) High level language (2) Low level language (3) OOP language (4) Machine language
81.	Three resistances $R_1 = 37$ ohm ± 5%, $R_2 = 75$ ohm ± 5%, $R_3 = 50$ ohm ± 5%, Determine the value of series resistance error if they are connected in series (1) ± 5% (2) ± 7.5% (3) ± 3.5% (4) ± 8.10%
82.	A 160 ±0% PF capacitor, an inductor of 160 μH and a resistor of 1200 ±10 Ω are connected in series. The value of resonant frequency is (1) 1000 kHz (2) 100 kHz (3) 1.1 MHz (4) 0.9 MHz

Question No.	Questions
83.	Normal probability curve is denoted by (1) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^2 / 2\sigma^2)$ (2) $\frac{1}{\sigma\sqrt{2\pi}} e^{x/2\sigma^2}$ (3) $\frac{1}{\sigma\sqrt{2\pi}} \exp(-x^2 / 2\sigma^2)$ (4) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^3 / 2\sigma^3)$
84.	Relative static error may be defined as (1) $\frac{\text{true value}}{\text{Absolute Error}}$ (2) $\frac{\text{true value} - \text{Absolute Error}}{\text{true value}}$ (3) $\frac{\text{Absolute Error}}{\text{true value} + \text{Absolute Error}}$ (4) $\frac{\text{Absolute Error}}{\text{true value}}$
85.	Static sensitivity at an operating point is given by (1) $\frac{\text{infinitesimal change in the output}}{\text{infinitesimal change in the input}}$ (2) $\frac{\text{infinitesimal change in the input}}{\text{infinitesimal change in the output}}$ (3) $\frac{\text{true value}}{\text{Absolute value}}$ (4) $\frac{\text{Absolute value}}{\text{true value}}$
86.	The input impedance of a cathode ray oscilloscope is of the order of (1) 10 Ω (2) Mega ohms (3) Kilo ohms (4) fraction of 1 ohms

Question No.	Questions
87.	The mean deviation $\overline{D}$ in terms of deviations from the mean value of n readings is (1) $\frac{\sum \lvert d \rvert}{n}$ (2) $\sqrt{\sum d^2/n}$ (3) $\sum d/n$ (4) $\sqrt{\frac{\sum d^2}{n}}$
88.	The transfer function of a system is $G(s) = \frac{100\, e^{-st}}{s(s+10)}$, the system (1) is a linear system (2) is a nonlinear system (3) has a transportation lag (4) None of the above
89.	8086 microprocessor has address bus of (1) 16 bits (2) 24 bits (3) 20 bits (4) 8 bits
90.	8086 has a bus cycle of at least (1) 4 clock periods (2) 2 clock periods (3) 3 clock periods (4) None of these
91.	8086 has basic no. of instructions (1) 64 (2) 117 (3) 128 (4) 256
92.	The starting address of an interrupt is called (in 8086 Micro processor) (1) stack pointer (2) program counter (3) interrupt output (4) interrupt vector

Question No.	Questions
93.	In 8086 type O interrupt is reserved for (1) single step (2) NMI (3) Interrupt on overflow (4) Divide Error
94.	For a fully controlled single phase converter supplies power to a resistive load of 10Ω, the input voltage is 230 V, 50 Hz, the value of average output voltage is for $\alpha = 45°$ (1) 276.74 V (2) 376.74 V (3) 176.74 V (4) 76.74 V
95.	Consider the circuit shown. What is the minimum width of gate pulse to ensure turn of the thyristor (I_L = 4 mA).  (1) 2 μs (2) 4 μs (3) 6 μs (4) 8 μs
96.	Snubber circuit is a (1) RL circuit (2) Purely Resistive (3) Purely inductive (4) R - C circuit
97.	Chopper is used for conversion of (1) ac to dc (2) dc to ac (3) ac to ac (4) dc to dc

Question No.	Questions
98.	Class 'C' chopper works in the following quadrants (1) 1st (2) 2nd (3) 1st & 2nd (4) All quadrants
99.	Induction heating is used for (1) Volume heating (2) Plastic packing (3) Plyboard industry (4) Surface heating
100.	For speed control of ac motors following are used (1) Cyclo converters (2) Choppers (3) Rectifiers (4) UJT and SCR

(Set–"X")

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(M.Phil/Ph.D/URS–EE–2018)

Electron. & Communication Engineering

Sr. No. 100022

Code **B**

Time : 1¼ Hours | Max. Marks : 100 | Total Questions : 100

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

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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.**
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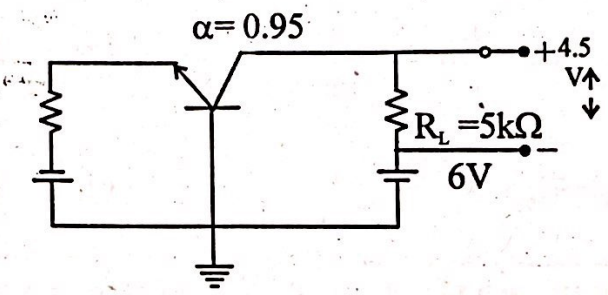
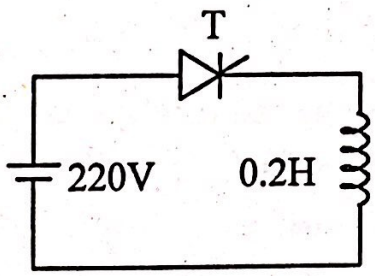
Question No.	Questions
1.	Current density in a semiconductor material is given by (1) $J = n \mu_n q/E$ (2) $J = p \mu p\, q/E$ (3) $J = (n \mu_n + p \mu p) . E$ (4) $J = (n \mu_n + p \mu p) / E$
2.	Fermi Level for a P-type semiconductor is given by (1) $E_F = E_V - KT\, ln \frac{N_A}{N_V}$ (2) $E_F = -E_V + KT\, ln \frac{N_A}{N_V}$ (3) $E_F = E_V - K_T\, ln \frac{N_A}{N_V}$ (4) $E_F = E_C - K_T\, ln \frac{N_C}{N_D}$
3.	For conductors the value of Hall coefficient is given by (1) $R_H = \frac{1}{nq}$ (2) $R_H = \frac{nq}{\mu_n}$ (3) $R_H = \frac{\mu_p}{nq}$ (4) $R_H = \frac{n\mu_n + p\mu_p}{q}$
4.	The band gap energy of Ge at 300 $\overset{o}{K}$ is given by (1) $E_g = 0.785$ eV (2) $E_g = 1.121$ eV (3) $E_g = 0.7181$ eV (4) $E_g = 1.212$ eV
5.	Under low level injection assumption, the injected minority current for an extrinsic semiconductor is essentially the (1) Diffusion current (2) Drift current (3) Recombination current (4) Induction current
6.	Ga As has band gap energy of the order of (1) 1.43 eV (2) 0.7 eV (3) 2.4 eV (4) 1.6 eV

Question No.	Questions
7.	Typical value of impurity concentration in a tunnel diode is (1) 1 part in 10^8 parts (2) 1 part in 10^3 parts (3) 1 PPM (4) 1 part in 10 parts
8.	In the given circuit, the value of collector current is :  (1) 0.8 mA (2) 0.9 mA (3) 0.947 mA (4) 0.847 A
9.	MOSFET can be used as a (1) Current controlled capacitor (2) Voltage controlled capacitor (3) Current controlled inductor (4) Voltage controlled inductor
10.	The effective channel length of a MOSFET in saturation decreases with the increase in (1) Gate voltage (2) Drain voltage (3) Source voltage (4) Body voltage
11.	8086 has basic no. of instructions (1) 64 (2) 117 (3) 128 (4) 256
12.	The starting address of an interrupt is called (in 8086 Micro processor) (1) stack pointer (2) program counter (3) interrupt output (4) interrupt vector

Question No.	Questions
13.	In 8086 type O interrupt is reserved for (1) single step (2) NMI (3) Interrupt on overflow (4) Divide Error
14.	For a fully controlled single phase converter supplies power to a resistive load of 10Ω, the input voltage is 230 V, 50 Hz, the value of average output voltage is for $\alpha = 45°$ (1) 276.74 V (2) 376.74 V (3) 176.74 V (4) 76.74 V
15.	Consider the circuit shown. What is the minimum width of gate pulse to ensure turn of the thyristor (I_L = 4 mA).  (1) 2 μs (2) 4 μs (3) 6 μs (4) 8 μs
16.	Snubber circuit is a (1) RL circuit (2) Purely Resistive (3) Purely inductive (4) R - C circuit
17.	Chopper is used for conversion of (1) ac to dc (2) dc to ac (3) ac to ac (4) dc to dc

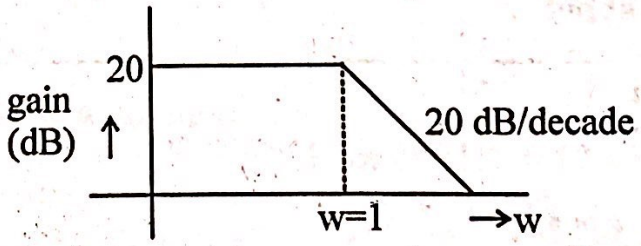
Question No.	Questions
18.	Class 'C' chopper works in the following quadrants (1) 1st (2) 2nd (3) 1st & 2nd (4) All quadrants
19.	Induction heating is used for (1) Volume heating (2) Plastic packing (3) Plyboard industry (4) Surface heating
20.	For speed control of ac motors following are used (1) Cyclo converters (2) Choppers (3) Rectifiers (4) UJT and SCR
21.	The Nyquist rate for message signal given by $m(t) = 10 \cos 10^3 \pi t \cdot \cos 4 \times 10^3 \pi t$ is (1) 10 kHz (2) 2.5 kHz (3) 5 kHz (4) 2 kHz
22.	Compression in PCM refers to relative compression of (1) Lower signal amplitudes (2) Higher signal amplitudes (3) Lower signal frequencies (4) Higher signal frequencies
23.	For a bit rate of 8 kbps, the best possible values of the transmitted frequencies in a coherent binary FSK system are (1) 16 kHz and 20 kHz (2) 20 kHz and 32 kHz (3) 20 kHz and 40 kHz (4) 32 kHz and 40 kHz
24.	Which function displays a string of text and append a new line character at its end ? (1) putchar ( ) (2) printf ( ) (3) puts ( ) (4) put ( )
25.	What will be output of the following code if i = 10 and a[10] = 20 a [i] = i ++ ; (1) a [10] will be 10 (2) a [11] will be 11 (3) a [11] will be 10 (4) None of the above

Question No.	Questions

26.	Following statement is given
	a = 0;
	b = (a = 0) ? 2 : 3;
	What will be the value of b
	(1) 2 (2) 3
	(3) 0 (4) 1

27.	Find the output for the following C program : main ( ) {int x = 2, y = 6, z = 6; x = y = = z ; printf (" % d", x) (1) 1 (2) 2 (3) 6 (4) 8
28.	The data type of the controlling statement of a switch statement can not be of the type : (1) int (2) char (3) short (4) float

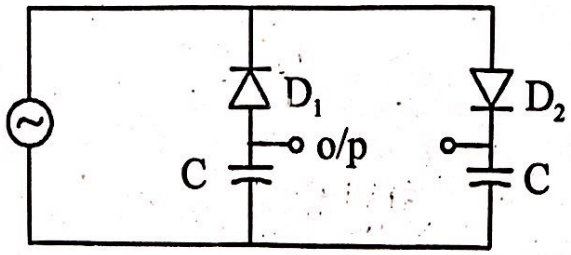
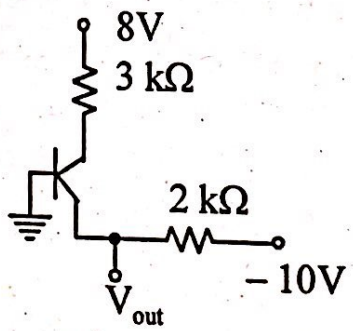
29.	main ( ) {
	Char a [ ] = "Hello world" ;
	print f (" % s", a + 1) ;
	}
	What is the output of above 'C' program
	(1) Compilation Error (2) Garbage Output
	(3) ello World (4) hello world

Question No.	Questions
30.	FORTRAN is a (1) High level language (2) Low level language (3) OOP language (4) Machine language
31.	The open loop transfer function of a certain control system is given by $GH = \frac{K}{(S+2)^3}$ for $K > 0$. For what value of gain factor, K, will the root locus of the control system cross the jw-axis. (1) 8 (2) 14 (3) 24 (4) 64
32.	For the above question, the value of the damping factor ξ for a design value of gain factor equal to 8 ? (1) 0.5 (2) 0.3 (3) 0.707 (4) 0.866
33.	A system has 14 poles and 2-zeroes. Its high frequency asymptote in its magnitude plot will have a slope of (1) – 40 dB/decade (2) – 240 dB/decade (3) – 280 dB/decade (4) – 320 dB/decade
34.	Bode plot of a stable system is shown in the following figure. The transfer function of the system is :  (1) $\frac{1}{(S+1)}$ (2) $10/(S+1)$ (3) $\frac{1}{S(S+1)}$ (4) $\frac{10}{s(s+1)}$

Question No.	Questions
35.	The state transition matrix represents (1) Forced response of the system (2) Free response of the system (3) Transient response of the system (4) None of these
36.	The attenuation of the optical fiber is of the order of (1) 0.01 dB/K_m (2) 0.2 dB/K_m (3) 20 dB/K_m (4) – 40 dB/K_m
37.	The operating frequency corresponding to 1550 nm is (1) 193 THz (2) 19.3 THz (3) 100 THz (4) 300 THz
38.	Which of the following operational mode is likely to produce the shortest pulse width (1) Q-switched (2) Cavity dumped (3) Quasi-CW (4) Mode Locked
39.	In optical communication systems, zero dispersion wavelength is operating at (1) 800 nm (2) 1330 nm (3) 1550 nm (4) 1630 nm
40.	In DWDM technology, the separation between the adjacent channels is of the order of (1) 4 – 6 nm (2) 0.8 nm (3) 0.1 nm (4) 8–10 nm

Question No.	Questions
41.	The octal equivalent of Hexadecimal number 2E.C1 would be (1) 212.602 (2) 56.602 (3) 56.623 (4) 65.302
42.	The complement of complement of $\bar{A}B + A\bar{B}$ will be (1) $AB + \bar{A}\bar{B}$ (2) $\bar{A}B$ (3) $\bar{A}B + A\bar{B}$ (4) $\bar{A}B.(\bar{A} + B)$
43.	What is minimum number of 2-input NAND gates required to complement a 2-input OR gate (1) 2 (2) 4 (3) 3 (4) 5
44.	A basic CMOS two input NAND gate requires (1) Two N-channel MOSFETs (2) Two N-Channel & tw P-channel MOSFETs (3) Two P-Channel MOSFETs (4) One N-Channel and one P-channel MOSFET
45.	IC 7402 is a – 2 input (1) NAND gate (2) EX-OR gate (3) NOR gate (4) OR Gate
46.	A decoder is nothing but a DEMUX without (1) control inputs (2) data input (3) enable input (4) clock
47.	The size of a PROM needed to implement a dual 8 to 1 MUX with common selection inputs would be (1) 256 K × 2 (2) 512 K × 2 (3) 1024 K × 2 (4) 128 K × 2
48.	Which one of following is not a synchronous input with reference to a flip flop (1) J input in JK flip flop (2) R input in RS flip flop (3) Preset input in JK flip flop (4) D-input in a D flip flop

Question No.	Questions
49.	A counter having a modulus of 64 should have a minimum of (1) Six flip flops (2) Seven flip flops (3) 5 – D – flip flops (4) 64 flip flops
50.	A logic circuit that gives a pulsed waveform at the output for a sinusoidal input (1) Bi stable multivibrator (2) Monostable multivibrator (3) Astable multivibrator (4) Schmitt trigger
51.	For a common base BJT, having $I_e = 5$ mA and $\alpha = 0.97$ an AC signal of 5 mV is applied between the base and the emitter terminals. The input impedance is given by (1) 5.2 Ω (2) 6 Ω (3) 4.9 Ω (4) 6.7 Ω
52.	The typical value of h_f for common base BJT is (1) 50 – 250 (2) – 50 (3) – 1 (4) 25
53.	If the source resistance, the output resistance of emitter follower using the simplified hybrid model would be (1) $\frac{h_{ie} + R_s}{1 + h_{fe}}$ (2) $\frac{h_{ie} + R_s}{h_{fe}}$ (3) $R_S + \frac{1}{h_{oe}}$ (4) $\frac{1}{h_{oe}}$
54.	The ripple factor is given by (1) $\sqrt{\left(\frac{I_{rms}}{I_{dc}}\right)^2 - 1}$ (2) $\left(1 - \sqrt{\frac{I_{rms}}{I_d}}\right)^2$ (3) $\frac{I_{rms}}{I_{dc}}$ (4) $\frac{I_{dc}}{I_{rms}}$

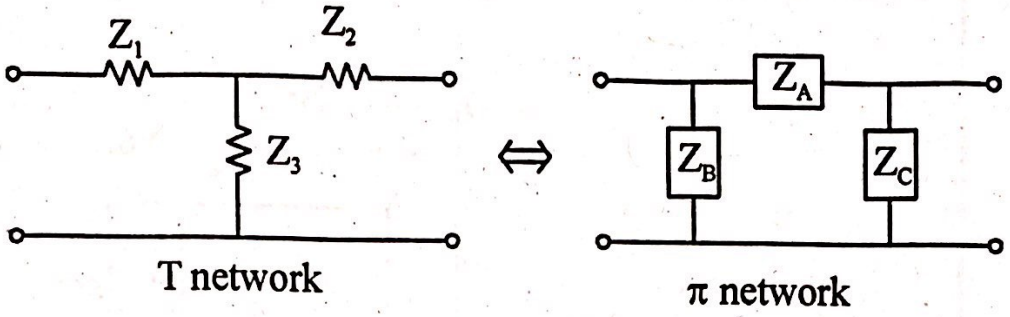
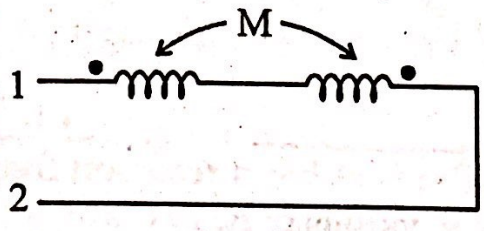
Question No.	Questions
55.	Following circuits is given by :  (1) Bridge rectifier (2) Ring modulator (3) Frequency discriminator (4) Voltage doubler
56.	For a transistor amplifier to be inherently stable against thermal run away, the condition is (1) $V_{CE} > \frac{V_{CC}}{2}$ (2) $V_{CE} < \frac{V_{CC}}{2}$ (3) $V_{CE} = \frac{V_{CC}}{2}$ (4) $V_{CE} = 1.5\, V_{CC}$
57.	For the circuit given the value of V_{out} is :  (V_{BE} = 0.7V) (1) +5.14 V (2) – 6.14 V (3) – 5.14 V (4) + 6.14 V
58.	The gain of a transistor amplifier falls at high frequency due to the (1) internal capacitance of the device (2) coupling capacitor at the input (3) skin effect (4) coupling capacitor at the output

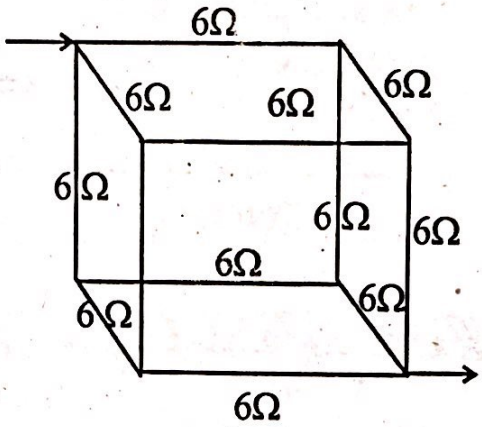
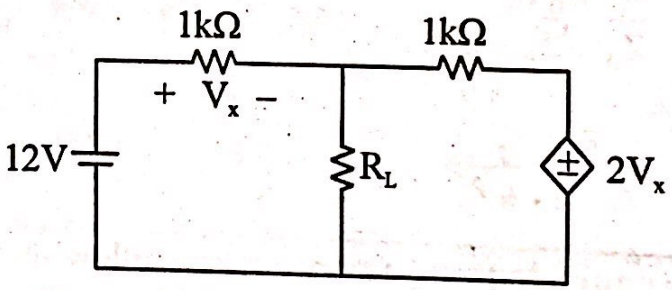
Question No.	Questions
59.	The effect of negative feedback on Noise is (1) $\frac{N}{1-\beta A}$ (2) $N(1-\beta A)$ (3) $N(1+\beta A)$ (4) $\frac{N}{1+\beta A}$
60.	Cross-over distortion behaviour is a characteristics of (1) Class – A output stage (2) Class – B output stage (3) Class – AB output stage (4) Common base output stage
61.	Poisson's equation is given by (1) $\nabla . D = 0$ (2) $\nabla^2 V = 0$ (3) $\nabla^2 V = -\frac{\rho}{\epsilon}$ (4) $\nabla^2 V = \rho / \epsilon_0$
62.	The total flux of a closed surface is equal to the net charge enclosed within the surface. This statement is an expression of (1) Divergence Theorem (2) Gauss's Law (3) Faraday Law (4) Maxwells equations
63.	The divergence of a vector $\overline{A} = x\,\hat{a}x + y\,\hat{a}y + z\,\hat{a}z$ is (1) 0 (2) $1/3$ (3) 1 (4) 3
64.	Which of the following expression is true for a perfect dielectric (1) $\sigma >> w\epsilon$ (2) $\sigma = w\epsilon$ (3) $\sigma << w\epsilon$ (4) $\sigma = \sqrt{w\epsilon}$

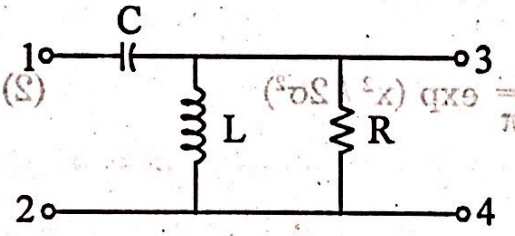
Question No.	Questions
65.	Given that $\sigma = 38$ m S/m & $\mu_r = 1$ for aluminium, the skin depth at a frequency of 2 MHz would be equal to (1) 64.5 nm (2) 64.5 μm (3) 57.7 nm (4) 57.77 μm
66.	The power density of solar radiation at a place is 1.2 kW/m^2. The approximate value of electric field corresponding to the incident solar power is given by (1) 950 V/m (2) 750 V/m (3) 450 V/m (4) 475 V/m
67.	A plane wave in air impinges at 45° on a loss less dielectric. The transmitted wave propagates at an angle 30° with respect to the normal. The value of dielectric constant of the dielectric is (1) 2.5 (2) 2.0 (3) 3.0 (4) 4.0
68.	A plane wave travelling in a free space is incident normally on a medium having $\epsilon_r = 4.0$. The fraction of power transmitted in to the medium is given by (1) $8/9$ (2) $1/2$ (3) $1/3$ (4) $5/6$
69.	A metallic waveguide can be considered as a (1) low pass filter (2) high pass filter (3) band pass filter (4) band reject filter

Question No.	Questions
70.	A 10 GHz wave is propagating in a waveguide having a wall separation of 4 cm. The largest number of half waves of electric intensity possible in the waveguide.is (1) 1 (2) 3 (3) 2 (4) 4
71.	The region of convergence of z-transform of the sequence $\left[\frac{5}{6}\right]^n u(n) - \left[\frac{6}{5}\right]^n u(-n-1)$ is (1) $\|z\| < 5/6$ (2) $\|z\| > 5/6$ (3) $\frac{5}{6} < \|z\| < \frac{6}{5}$ (4) $\frac{6}{5} < \|z\| < \infty$
72.	The power saving in case of SSB/SC signal as compared to a standard AM signal for modulation index = 0.5 is (1) 94.4 % (2) 23.2 % (3) 56.7 % (4) 75 %
73.	Which of the following suffer (s) from the threshold effect (1) AM detection using envelope detection (2) AM detection using synchronous detection (3) FM detection using a discriminator (4) SSB detection with synchronous detection
74.	A sinusoidal wave of amplitude 10 V and frequency 1kHz is applied to an FM generator having a frequency sensitivity constant of 40 Hz/V, the frequency deviation is (1) 100 Hz (2) 200 Hz (3) 400 Hz (4) 500 Hz

Question No.	Questions
75.	In a VSB system, modulating frequency of 3 MHz results in a sideband power of 25 W. If the carrier power is 100 W, the depth of modulation is (1) 25% (2) 50% (3) 75% (4) 100%
76.	An FM signal is represented by $v(t) = 15 \cos [10^8 \pi t + 6 \sin 2\pi \times 10^3 t]$. The maximum phase deviation in radians are (1) 5 (2) 8 (3) 6 (4) 9
77.	PLL can be used to demodulate (1) PAM signals (2) FM signals (3) PCM (4) DSBSC
78.	PAM signals can be detected by using (1) ADC (2) Integrator (3) Band pass filter (4) High pass filter
79.	The input to a coherent detector is DSBSC signal plus Noise, the noise at the detector output is given by (1) In phase component (2) Quadrature component (3) Zero (4) Envelope
80.	A Hilbert transformer is a (1) Non linear system (2) Non-causal system (3) Time-varying system (4) Low pass system

Question No.	Questions
81.	T to π transformation gives the value of $Z_C \Rightarrow$  T network ⇔ π network (1) $\left(Z_C = \frac{Z_1 Z_2 + Z_2 Z_3 + Z_1 Z_3}{Z_1}\right)$ (2) $Z_C = \frac{Z_A Z_B}{Z_A + Z_B + Z_C}$ (3) $Z_C = \frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_A Z_C + Z_B Z_C}$ (4) $Z_C = \frac{Z_1 Z_2 Z_3}{Z_1 + Z_2 + Z_3}$
82.	In the above question π to T conversion gives the value of Z_1 (1) $\frac{Z_B Z_C}{Z_A + Z_B + Z_C}$ (2) $\frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_B Z_C + Z_C Z_A}$ (3) $\frac{Z_1 + Z_2}{Z_1 + Z_2 + Z_3}$ (4) $\frac{Z_A Z_B}{Z_A + Z_B + Z_C}$
83.	The equivalent inductance of the following is given by  (1) $L_1 + L_2 + M$ (2) $L_1 + L_2 - M$ (3) $L_1 + L_2 + 2M$ (4) $L_1 + L_2 - 2M$

Question No.	Questions
84.	Every arm of the cube has a resistance of 6 ohms. The equivalent resistance of the cube is given by  (1) 36 Ω (2) 12 Ω (3) 10 Ω (4) 5 Ω
85.	In the following circuit, the value of R_L is given by  (1) 0.5 kΩ (2) 250 Ω (3) 1 kΩ (4) 2k Ω
86.	Series RLC circuit has a resonant frequency of 1 MHz and a quality factor of 100, if the values of R, L, C are doubled, what is the new value of Q ? (1) 25 (2) 50 (3) 100 (4) 200

Question No.	Questions
87.	In a series RLC circuit R = 2kΩ, L = 1H, C = $\frac{1}{400}$ μF, The resonant frequency is (1) 2×10^4 Hz (2) $\frac{10^4}{\pi}$ Hz (3) 10 kHz (4) 20π kHz
88.	For a 2-port network to be reciprocal, following is true (1) $Z_{11} = Z_{22}$ and $Y_{11} = Y_{22}$ (2) $Y_{21} = Y_{12}$ & $h_{21} = -h_{12}$ (3) AD – BC = 0 (4) AB – CD = 0
89.	The network shown behaves like a  (1) High pass filter (2) LPF (3) BPF (4) Band stop filter
90.	If the scattering matrix [S] of a two port network is $[S] = \begin{bmatrix} 0.2\angle 0° & 0.9\angle 90° \\ 0.9\angle 90° & 0.1\angle 90° \end{bmatrix}$ then the network is (1) lossless and reciprocal (2) lossless but non reciprocal (3) lossy but reciprocal (4) neither lossy nor reciprocal

Question No.	Questions
91.	Three resistances $R_1 = 37$ ohm ± 5%, $R_2 = 75$ ohm ± 5%, $R_3 = 50$ ohm ± 5%, Determine the value of series resistance error if they are connected in series (1) ± 5% (2) ± 7.5% (3) ± 3.5% (4) ± 8.10%
92.	A 160 ±0% PF capacitor, an inductor of 160 μH and a resistor of 1200 ±10 Ω are connected in series. The value of resonant frequency is (1) 1000 kHz (2) 100 kHz (3) 1.1 MHz (4) 0.9 MHz
93.	Normal probability curve i , denoted by (1) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^2 / 2\sigma^2)$ (2) $\frac{1}{\sigma\sqrt{2\pi}} e^{x/2\sigma^2}$ (3) $\frac{1}{\sigma\sqrt{2\pi}} \exp(-x^2 / 2\sigma^2)$ (4) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^3 / 2\sigma^3)$
94.	Relative static error may be defined as (1) $\frac{\text{true value}}{\text{Absolute Error}}$ (2) $\frac{\text{true value} - \text{Absolute Error}}{\text{true value}}$ (3) $\frac{\text{Absolute Error}}{\text{true value} + \text{Absolute Error}}$ (4) $\frac{\text{Absolute Error}}{\text{true value}}$

Question No.	Questions
95.	Static sensitivity at an operating point is given by (1) $\frac{\text{infinitesimal change in the output}}{\text{infinitesimal change in the input}}$ (2) $\frac{\text{infinitesimal change in the input}}{\text{infinitesimal change in the output}}$ (3) $\frac{\text{true value}}{\text{Absolute value}}$ (4) $\frac{\text{Absolute value}}{\text{true value}}$
96.	The input impedance of a cathode ray oscilloscope is of the order of (1) 10 Ω (2) Mega ohms (3) Kilo ohms (4) fraction of 1 ohms
97.	The mean deviation $\overline{D}$ in terms of deviations from the mean value of n readings is (1) $\frac{\sum \lvert d \rvert}{n}$ (2) $\sqrt{\sum d^2/n}$ (3) $\sum d/n$ (4) $\sqrt{\frac{\sum d^2}{n}}$

Question No.	Questions
98.	The transfer function of a system is $G(s) = \frac{100\, e^{-st}}{s(s+10)}$, the system (1) is a linear system (2) is a nonlinear system (3) has a transportation lag (4) None of the above
99.	8086 microprocessor has address bus of (1) 16 bits (2) 24 bits (3) 20 bits (4) 8 bits
100.	8086 has a bus cycle of at least (1) 4 clock periods (2) 2 clock periods (3) 3 clock periods (4) None of these

(Set–"X")

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(M.Phil/Ph.D/URS–EE–2018)

Code **C**

Electronics & Communication Engineering

Sr. No. 100003

Time : 1¼ Hours **Max. Marks : 100** **Total Questions : 100**

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

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1. All questions are compulsory.
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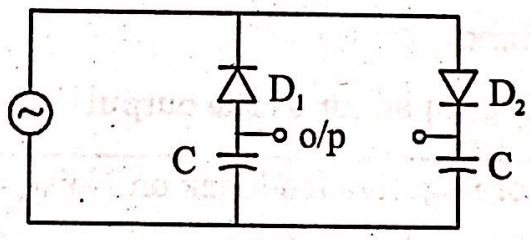
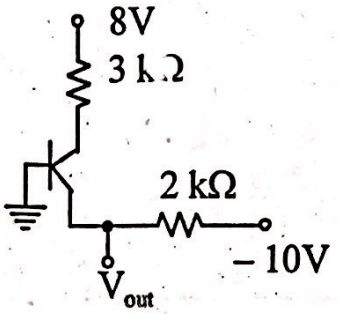
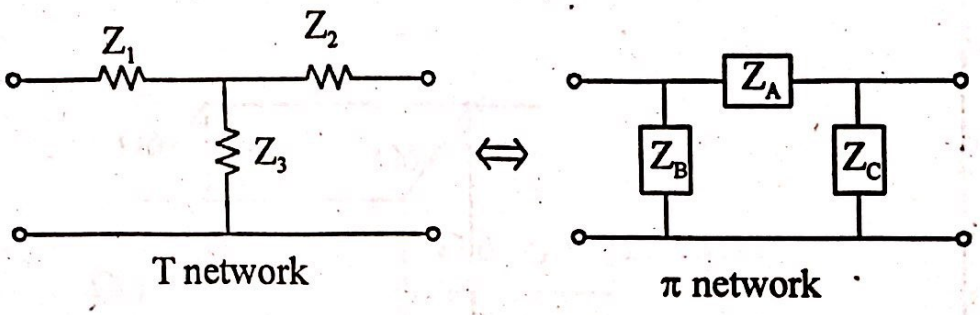
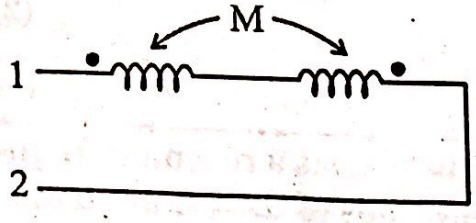
3. Keeping in view the transparency of the examination system, carbonless OMR Sheet is provided to the candidate so that a copy of OMR Sheet may be kept by the candidate.
4. Question Booklet along with answer key of all the A, B, C, D code will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet / Answer Key, the same may be brought to the notice of the Controller of Examination in writing / through E.Mail within 24 hours of uploading the same on the University Website. 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 book-let itself. Answers **MUST NOT** be ticked in the Question book-let.
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 <u>BALL POINT PEN</u> 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 BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

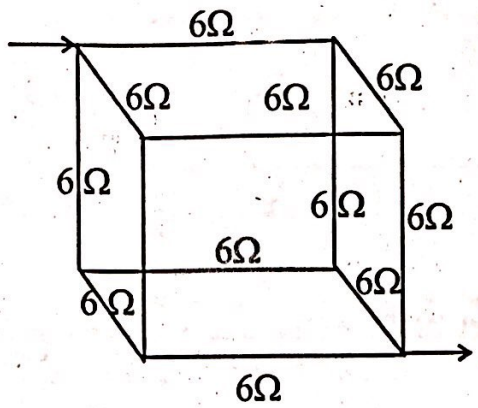
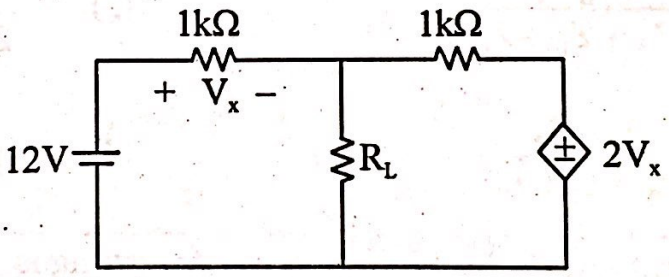
Question No.	Questions
1.	Poisson's equation is given by (1) $\nabla.D = 0$ (2) $\nabla^2 V = 0$ (3) $\nabla^2 V = -\frac{\rho}{\epsilon}$ (4) $\nabla^2 V = \rho/\epsilon_0$
2.	The total flux of a closed surface is equal to the net charge enclosed within the surface. This statement is an expression of (1) Divergence Theorem (2) Gauss's Law (3) Faraday Law (4) Maxwells equations
3.	The divergence of a vector $\overline{A} = x\,\hat{a}x + y\,\hat{a}y + z\,\hat{a}z$ is (1) 0 (2) $1/3$ (3) 1 (4) 3
4.	Which of the following expression is true for a perfect dielectric (1) $\sigma >> w\epsilon$ (2) $\sigma = w\epsilon$ (3) $\sigma << w\epsilon$ (4) $\sigma = \sqrt{w\epsilon}$
5.	Given that σ = 38 m S/m & μ_r = 1 for aluminium, the skin depth at a frequency of 2 MHz would be equal to (1) 64.5 nm (2) 64.5 μm (3) 57.7 nm (4) 57.77 μm
6.	The power density of solar radiation at a place is 1.2 kW/m^2. The approximate value of electric field corresponding to the incident solar power is given by (1) 950 V/m (2) 750 V/m (3) 450 V/m (4) 475 V/m

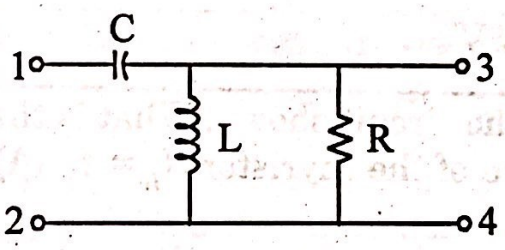
Question No.	Questions
7.	A plane wave in air impinges at 45° on a loss less dielectric. The transmitted wave propagates at an angle 30° with respect to the normal. The value of dielectric constant of the dielectric is (1) 2.5 (2) 2.0 (3) 3.0 (4) 4.0
8.	A plane wave travelling in a free space is incident normally on a medium having $\epsilon_r = 4.0$. The fraction of power transmitted in to the medium is given by (1) $\frac{8}{9}$ (2) $\frac{1}{2}$ (3) $\frac{1}{3}$ (4) $\frac{5}{6}$
9.	A metallic waveguide can be considered as a (1) low pass filter (2) high pass filter (3) band pass filter (4) band reject filter
10.	A 10 GHz wave is propagating in a waveguide having a wall separation of 4 cm. The largest number of half waves of electric intensity possible in the waveguide is (1) 1 (2) 3 (3) 2 (4) 4
11.	For a common base BJT, having $I_e = 5$ mA and $\alpha = 0.97$ an AC signal of 5 mV is applied between the base and the emitter terminals. The input impedance is given by (1) 5.2 Ω (2) 6 Ω (3) 4.9 Ω (4) 6.7 Ω
12.	The typical value of h_f for common base BJT is (1) 50 – 250 (2) – 50 (3) – 1 (4) 25

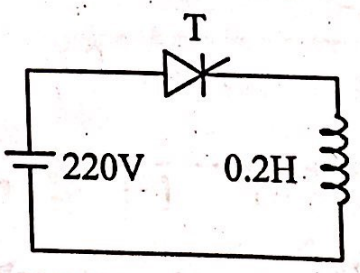
Question No.	Questions
13.	If the source resistance, the output resistance of emitter follower using the simplified hybrid model would be (1) $\frac{h_{ie}+R_s}{1+h_{fe}}$ (2) $\frac{h_{ie}+R_s}{h_{fe}}$ (3) $R_S+\frac{1}{h_{oe}}$ (4) $\frac{1}{h_{oe}}$
14.	The ripple factor is given by (1) $\sqrt{\left(\frac{I_{rms}}{I_{dc}}\right)^2-1}$ (2) $\left(1-\sqrt{\frac{I_{rms}}{I_d}}\right)^2$ (3) $\frac{I_{rms}}{I_{dc}}$ (4) $\frac{I_{dc}}{I_{rms}}$
15.	Following circuits is given by :  (1) Bridge rectifier (2) Ring modulator (3) Frequency discriminator (4) Voltage doubler
16.	For a transistor amplifier to be inherently stable against thermal run away, the condition is (1) $V_{CE} > \frac{V_{CC}}{2}$ (2) $V_{CE} < \frac{V_{CC}}{2}$ (3) $V_{CE} = \frac{V_{CC}}{2}$ (4) $V_{CE} = 1.5\, V_{CC}$

Question No.	Questions
17.	For the circuit given the value of V_{out} is :  (V_{BE} = 0.7V) (1) +5.14 V (2) –6.14 V (3) –5.14 V (4) +6.14 V
18.	The gain of a transistor amplifier falls at high frequency due to the (1) internal capacitance of the device (2) coupling capacitor at the input (3) skin effect (4) coupling capacitor at the output
19.	The effect of negative feedback on Noise is (1) $\frac{N}{1-\beta A}$ (2) $N(1-\beta A)$ (3) $N(1+\beta A)$ (4) $\frac{N}{1+\beta A}$
20.	Cross-over distortion behaviour is a characteristics of (1) Class – A output stage (2) Class – B output stage (3) Class – AB output stage (4) Common base output stage

Question No.	Questions
21.	T to π transformation gives the value of $Z_C \Rightarrow$  T network π network (1) $\left(Z_C = \frac{Z_1 Z_2 + Z_2 Z_3 + Z_1 Z_3}{Z_1}\right)$ (2) $Z_C = \frac{Z_A Z_B}{Z_A + Z_B + Z_C}$ (3) $Z_C = \frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_A Z_C + Z_B Z_C}$ (4) $Z_C = \frac{Z_1 Z_2 Z_3}{Z_1 + Z_2 + Z_3}$
22.	In the above question π to T conversion gives the value of Z_1 (1) $\frac{Z_B Z_C}{Z_A + Z_B + Z_C}$ (2) $\frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_B Z_C + Z_C Z_A}$ (3) $\frac{Z_1 + Z_2}{Z_1 + Z_2 + Z_3}$ (4) $\frac{Z_A Z_B}{Z_A + Z_B + Z_C}$
23.	The equivalent inductance of the following is given by  (1) $L_1 + L_2 + M$ (2) $L_1 + L_2 - M$ (3) $L_1 + L_2 + 2M$ (4) $L_1 + L_2 - 2M$

Question No.	Questions
24.	Every arm of the cube has a resistance of 6 ohms. The equivalent resistance of the cube is given by  (1) 36 Ω (2) 12 Ω (3) 10 Ω (4) 5 Ω
25.	In the following circuit, the value of R_L is given by  (1) 0.5 kΩ (2) 250 Ω (3) 1 kΩ (4) 2k Ω
26.	Series RLC circuit has a resonant frequency of 1 MHz and a quality factor of 100, if the values of R, L, C are doubled, what is the new value of Q ? (1) 25 (2) 50 (3) 100 (4) 200

Question No.	Questions
27.	In a series RLC circuit R = 2kΩ, L = 1H, C = $\frac{1}{400}$ μF, The resonant frequency is (1) 2×10^4 Hz (2) $\frac{10^4}{\pi}$ Hz (3) 10 kHz (4) 20π kHz
28.	For a 2-port network to be reciprocal, following is true (1) $Z_{11} = Z_{22}$ and $Y_{11} = Y_{22}$ (2) $Y_{21} = Y_{12}$ & $h_{21} = -h_{12}$ (3) $AD - BC = 0$ (4) $AB - CD = 0$
29.	The network shown behaves like a  (1) High pass filter (2) LPF (3) BPF (4) Band stop filter
30.	If the scattering matrix [S] of a two port network is $[S] = \begin{bmatrix} 0.2\angle 0° & 0.9\angle 90° \\ 0.9\angle 90° & 0.1\angle 90° \end{bmatrix}$ then the network is (1) lossless and reciprocal (2) lossless but non reciprocal (3) lossy but reciprocal (4) neither lossy nor reciprocal
31.	8086 has basic no. of instructions (1) 64 (2) 117 (3) 128 (4) 256

Question No.	Questions
32.	The starting address of an interrupt is called (in 8086 Micro processor) (1) stack pointer (2) program counter (3) interrupt output (4) interrupt vector
33.	In 8086 type O interrupt is reserved for (1) single step (2) NMI (3) Interrupt on overflow (4) Divide Error
34.	For a fully controlled single phase converter supplies power to a resistive load of 10Ω, the input voltage is 230 V, 50 Hz, the value of average output voltage is for $\alpha = 45°$ (1) 276.74 V (2) 376.74 V (3) 176.74 V (4) 76.74 V
35.	Consider the circuit shown. What is the minimum width of gate pulse to ensure turn of the thyristor ($I_L = 4$ mA).  (1) 2 μs (2) 4 μs (3) 6 μs (4) 8 μs
36.	Snubber circuit is a (1) RL circuit (2) Purely Resistive (3) Purely inductive (4) R - C circuit

Question No.	Questions
37.	Chopper is used for conversion of (1) ac to dc (2) dc to ac (3) ac to ac (4) dc to dc
38.	Class 'C' chopper works in the following quadrants (1) 1st (2) 2nd (3) 1st & 2nd (4) All quadrants
39.	Induction heating is used for (1) Volume heating (2) Plastic packing (3) Plyboard industry (4) Surface heating
40.	For speed control of ac motors following are used (1) Cyclo converters (2) Choppers (3) Rectifiers (4) UJT and SCR
41.	The region of convergence of z-transform of the sequence $\left[\frac{5}{6}\right]^n u(n) - \left[\frac{6}{5}\right]^n u(-n-1)$ is (1) $\lvert z\rvert < 5/6$ (2) $\lvert z\rvert > 5/6$ (3) $\frac{5}{6} < \lvert z\rvert < \frac{6}{5}$ (4) $\frac{6}{5} < \lvert z\rvert < \infty$
42.	The power saving in case of SSB/SC signal as compared to a standard AM signal for modulation index = 0.5 is (1) 94.4 % (2) 23.2 % (3) 56.7 % (4) 75 %

Question No.	Questions
43.	Which of the following suffer (s) from the threshold effect (1) AM detection using envelope detection (2) AM detection using synchronous detection (3) FM detection using a discriminator (4) SSB detection with synchronous detection
44.	A sinusoidal wave of amplitude 10 V and frequency 1kHz is applied to an FM generator having a frequency sensitivity constant of 40 Hz/V, the frequency deviation is (1) 100 Hz (2) 200 Hz (3) 400 Hz (4) 500 Hz
45.	In a VSB system, modulating frequency of 3 MHz results in a sideband power of 25 W. If the carrier power is 100 W, the depth of modulation is (1) 25% (2) 50% (3) 75% (4) 100%
46.	An FM signal is represented by $v(t) = 15 \cos [10^8 \pi t + 6 \sin 2\pi \times 10^3 t]$. The maximum phase deviation in radians are (1) 5 (2) 8 (3) 6 (4) 9
47.	PLL can be used to demodulate (1) PAM signals (2) FM signals (3) PCM (4) DSBSC
48.	PAM signals can be detected by using (1) ADC (2) Integrator (3) Band pass filter (4) High pass filter

Question No.	Questions
49.	The input to a coherent detector is DSBSC signal plus Noise, the noise at the detector output is given by (1) In phase component (2) Quadrature component (3) Zero (4) Envelope
50.	A Hilbert transformer is a (1) Non linear system (2) Non-causal system (3) Time-varying system (4) Low pass system
51.	The octal equivalent of Hexadecimal number 2E.C1 would be (1) 212.602 (2) 56.602 (3) 56.623 (4) 65.302
52.	The complement of complement of $\overline{A}B + A\overline{B}$ will be (1) $AB + \overline{A}\,\overline{B}$ (2) $\overline{A}B$ (3) $\overline{A}B + A\overline{B}$ (4) $\overline{A}B.(\overline{A} + B)$
53.	What is minimum number of 2-input NAND gates required to complement a 2-input OR gate (1) 2 (2) 4 (3) 3 (4) 5
54.	A basic CMOS two input NAND gate requires (1) Two N-channel MOSFETs (2) Two N-Channel & two P-channel MOSFETs (3) Two P-Channel MOSFETs (4) One N-Channel and one P-channel MOSFET
55.	IC 7402 is a – 2 input, (1) NAND gate (2) EX-OR gate (3) NOR gate (4) OR Gate

Question No.	Questions
56.	A decoder is nothing but a DEMUX without (1) control inputs (2) data input (3) enable input (4) clock
57.	The size of a PROM needed to implement a dual 8 to 1 MUX with common selection inputs would be (1) 256 K × 2 (2) 512 K × 2 (3) 1024 K × 2 (4) 128 K × 2
58.	Which one of following is not a synchronous input with reference to a flip flop (1) J input in JK flip flop (2) R input in RS flip flop (3) Preset input in JK flip flop (4) D-input in a D flip flop
59.	A counter having a modulus of 64 should have a minimum of (1) Six flip flops (2) Seven flip flops (3) 5 – D – flip flops (4) 64 flip flops
60.	A logic circuit that gives a pulsed waveform at the output for a sinusoidal input (1) Bi stable multivibrator (2) Monostable multivibrator (3) Astable multivibrator (4) Schmitt trigger
61.	The Nyquist rate for message signal given by $m(t) = 10 \cos 10^3 \pi t \cdot \cos 4 \times 10^3 \pi t$ is (1) 10 kHz (2) 2.5 kHz (3) 5 kHz (4) 2 kHz
62.	Compression in PCM refers to relative compression of (1) Lower signal amplitudes (2) Higher signal amplitudes (3) Lower signal frequencies (4) Higher signal frequencies

Question No.	Questions
63.	For a bit rate of 8 kbps, the best possible values of the transmitted frequencies in a coherent binary FSK system are (1) 16 kHz and 20 kHz (2) 20 kHz and 32 kHz (3) 20 kHz and 40 kHz (4) 32 kHz and 40 kHz
64.	Which function displays a string of text and append a new line character at its end ? (1) putchar ( ) (2) printf ( ) (3) puts ( ) (4) put ( )
65.	What will be output of the following code if i = 10 and a[10] = 20 ; a [i] = i ++ ; (1) a [10] will be 10 (2) a [11] will be 11 (3) a [11] will be 10 (4) None of the above

66.	Following statement is given
	a = 0;
	b = (a = 0) ? 2 : 3;
	What will be the value of b
	(1) 2 (2) 3
	(3) 0 (4) 1

67.	Find the output for the following C program : main ( ) {int x = 2, y = 6, z = 6; x = y = = z ; printf (" % d"; x) (1) 1 (2) 2 (3) 6 (4) 8

Question No.	Questions
68.	The data type of the controlling statement of a switch statement can not be of the type : (1) int (2) char (3) short (4) float

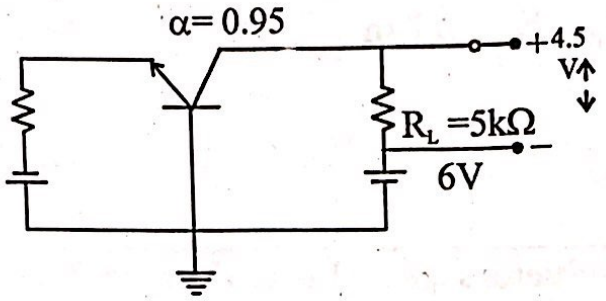
69.	main ( ) {
	Char a [ ] = "Hello world" ;
	print f (" % s", a + 1) ;
	}
	What is the output of above 'C' program
	(1) Compilation Error (2) Garbage Output
	(3) ello World (4) hello world

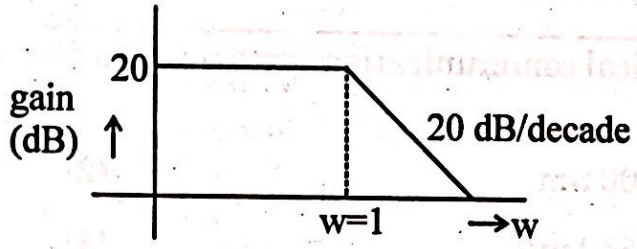
70.	FORTRAN is a (1) High level language (2) Low level language (3) OOP language (4) Machine language
71.	Three resistances $R_1 = 37$ ohm ± 5%, $R_2 = 75$ ohm ± 5%, $R_3 = 50$ ohm ± 5%, Determine the value of series resistance error if they are connected in series (1) ± 5% (2) ± 7.5% (3) ± 3.5% (4) ± 8.10%
72.	A 160 ±0% PF capacitor, an inductor of 160 μH and a resistor of 1200 ±10 Ω are connected in series. The value of resonant frequency is (1) 1000 kHz (2) 100 kHz (3) 1.1 MHz (4) 0.9 MHz

Question No.	Questions
73.	Normal probability curve is denoted by (1) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^2 / 2\sigma^2)$ (2) $\frac{1}{\sigma\sqrt{2\pi}} e^{x/2\sigma^2}$ (3) $\frac{1}{\sigma\sqrt{2\pi}} \exp(-x^2 / 2\sigma^2)$ (4) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^3 / 2\sigma^3)$
74.	Relative static error may be defined as (1) $\frac{\text{true value}}{\text{Absolute Error}}$ (2) $\frac{\text{true value} - \text{Absolute Error}}{\text{true value}}$ (3) $\frac{\text{Absolute Error}}{\text{true value} + \text{Absolute Error}}$ (4) $\frac{\text{Absolute Error}}{\text{true value}}$
75.	Static sensitivity at an operating point is given by (1) $\frac{\text{infinitesimal change in the output}}{\text{infinitesimal change in the input}}$ (2) $\frac{\text{infinitesimal change in the input}}{\text{infinitesimal change in the output}}$ (3) $\frac{\text{true value}}{\text{Absolute value}}$ (4) $\frac{\text{Absolute value}}{\text{true value}}$
76.	The input impedance of a cathode ray oscilloscope is of the order of (1) 10 Ω (2) Mega ohms (3) Kilo ohms (4) fraction of 1 ohms

Question No.	Questions
77.	The mean deviation $\overline{D}$ in terms of deviations from the mean value of n readings is (1) $\frac{\sum \lvert d \rvert}{n}$ (2) $\sqrt{\sum d^2/n}$ (3) $\sum d/n$ (4) $\sqrt{\frac{\sum d^2}{n}}$
78.	The transfer function of a system is $G(s) = \frac{100\, e^{-st}}{s(s+10)}$, the system (1) is a linear system (2) is a nonlinear system (3) has a transportation lag (4) None of the above
79.	8086 microprocessor has address bus of (1) 16 bits (2) 24 bits (3) 20 bits (4) 8 bits
80.	8086 has a bus cycle of at least (1) 4 clock periods (2) 2 clock periods (3) 3 clock periods (4) None of these
81.	Current density in a semiconductor material is given by (1) $J = n\, \mu_n\, q/E$ (2) $J = p\, \mu p\, q/E$ (3) $J = (n\, \mu_n + p\, \mu p) \cdot E$ (4) $J = (n\, \mu_n + p\, \mu p) / E$

Question No.	Questions
82.	Fermi Level for a P-type semiconductor is given by (1) $E_F = E_V - KT\, ln \frac{N_A}{N_V}$ (2) $E_F = -E_V + KT\, ln \frac{N_A}{N_V}$ (3) $E_F = E_V - K_T\, ln \frac{N_A}{N_V}$ (4) $E_F = E_C - K_T\, ln \frac{N_C}{N_D}$
83.	For conductors the value of Hall coefficient is given by (1) $R_H = \frac{1}{nq}$ (2) $R_H = \frac{nq}{\mu_n}$ (3) $R_H = \frac{\mu_p}{nq}$ (4) $R_H = \frac{n\mu_n + p\mu_p}{q}$
84.	The band gap energy of Ge at 300 ^{o}K is given by (1) $E_g = 0.785$ eV (2) $E_g = 1.121$ eV (3) $E_g = 0.7181$ eV (4) $E_g = 1.212$ eV
85.	Under low level injection assumption, the injected minority current for an extrinsic semiconductor is essentially the (1) Diffusion current (2) Drift current (3) Recombination current (4) Induction current
86.	Ga As has band gap energy of the order of (1) 1.43 eV (2) 0.7 eV (3) 2.4 eV (4) 1.6 eV
87.	Typical value of impurity concentration in a tunnel diode is (1) 1 part in 10^8 parts (2) 1 part in 10^3 parts (3) 1 PPM (4) 1 part in 10 parts

Question No.	Questions
88.	In the given circuit, the value of collector current is :  (1) 0.8 mA (2) 0.9 mA (3) 0.947 mA (4) 0.847 A
89.	MOSFET can be used as a (1) Current controlled capacitor (2) Voltage controlled capacitor (3) Current controlled inductor (4) Voltage controlled inductor
90.	The effective channel length of a MOSFET in saturation decreases with the increase in (1) Gate voltage (2) Drain voltage (3) Source voltage (4) Body voltage
91.	The open loop transfer function of a certain control system is given by $GH = \frac{K}{(S+2)^3}$ for $K > 0$. For what value of gain factor; K, will the root locus of the control system cross the jw-axis. (1) 8 (2) 14 (3) 24 (4) 64

Question No.	Questions
92.	For the above question, the value of the damping factor ξ for a design value of gain factor equal to 8 ? (1) 0.5 (2) 0.3 (3) 0.707 (4) 0.866
93.	A system has 14 poles and 2-zeroes. Its high frequency asymptote in its magnitude plot will have a slope of (1) – 40 dB/decade (2) – 240 dB/decade (3) – 280 dB/decade (4) – 320 dB/decade
94.	Bode plot of a stable system is shown in the following figure. The transfer function of the system is :  (1) $\frac{1}{(S+1)}$ (2) $\frac{10}{(S+1)}$ (3) $\frac{1}{S(S+1)}$ (4) $\frac{10}{s(s+1)}$
95.	The state transition matrix represents (1) Forced response of the system (2) Free response of the system (3) Transient response of the system (4) None of these

Question No.	Questions
96.	The attenuation of the optical fiber is of the order of (1) 0.01 dB/K_m (2) 0.2 dB/K_m (3) 20 dB/K_m (4) – 40 dB/K_m
97.	The operating frequency corresponding to 1550 nm is (1) 193 THz (2) 19.3 THz (3) 100 THz (4) 300 THz
98.	Which of the following operational mode is likely to produce the shortest pulse width (1) Q-switched (2) Cavity dumped (3) Quasi-CW (4) Mode Locked
99.	In optical communication systems, zero dispersion wavelength is operating at (1) 800 nm (2) 1330 nm (3) 1550 nm (4) 1630 nm
100.	In DWDM technology, the separation between the adjacent channels is of the order of (1) 4 – 6 nm (2) 0.8 nm (3) 0.1 nm (4) 8–10 nm

(Set–"X")

(DO NOT OPEN THIS QUESTION BOOKLET BEFORE TIME OR UNTIL YOU ARE ASKED TO DO SO)

(M.Phil/Ph.D/URS–EE–2018)

Code **D**

Electronics & Communication Engineering

Sr. No. 100004

Time : 1¼ Hours **Max. Marks : 100** **Total Questions : 100**

Roll No. _____ (in figure) _____ (in words)

Name : _____ Father's Name : _____

Mother's Name : _____ Date of Examination : _____

(Signature of the candidate) (Signature of the Invigilator)

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1. All questions are compulsory.
2. The candidates must return the Question book-let as well as OMR answer-sheet to the Invigilator concerned before leaving the Examination Hall, failing which a case of use of unfair-means / 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 will be got uploaded on the University website after the conduct of Entrance Examination. In case there is any discrepancy in the Question Booklet / Answer Key, the same may be brought to the notice of the Controller of Examination in writing / through E.Mail within 24 hours of uploading the same on the University Website. 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 book-let itself. Answers MUST NOT be ticked in the Question book-let.
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 BOOK-LET. COMPLAINTS, IF ANY, REGARDING MISPRINTING ETC. WILL NOT BE ENTERTAINED 30 MINUTES AFTER STARTING OF THE EXAMINATION.

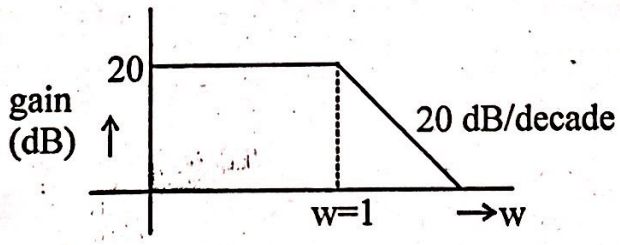
Question No.	Questions
1.	The Nyquist rate for message signal given by $m(t) = 10 \cos 10^3 \pi t \cdot \cos 4 \times 10^3 \pi t$ is (1) 10 kHz (2) 2.5 kHz (3) 5 kHz (4) 2 kHz
2.	Compression in PCM refers to relative compression of (1) Lower signal amplitudes (2) Higher signal amplitudes (3) Lower signal frequencies (4) Higher signal frequencies
3.	For a bit rate of 8 kbps, the best possible values of the transmitted frequencies in a coherent binary FSK system are (1) 16 kHz and 20 kHz (2) 20 kHz and 32 kHz (3) 20 kHz and 40 kHz (4) 32 kHz and 40 kHz
4.	Which function displays a string of text and append a new line character at its end ? (1) putchar ( ) (2) printf ( ) (3) puts ( ) (4) put ( )
5.	What will be output of the following code if i = 10 and a[10] = 20 ; a [i] = i ++ ; (1) a [10] will be 10 (2) a [11] will be 11 (3) a [11] will be 10 (4) None of the above

6.	Following statement is given
	a = 0;
	b = (a = 0) ? 2 : 3;
	What will be the value of b
	(1) 2 (2) 3
	(3) 0 (4) 1

Question No.	Questions
7.	Find the output for the following C program : main ( ) {int x = 2, y = 6, z = 6; x = y = = z ; printf (" % d", x) (1) 1 (2) 2 (3) 6 (4) 8
8.	The data type of the controlling statement of a switch statement can not be of the type : (1) int (2) char (3) short (4) float

9.	main ( ) {
	Char a [ ] = "Hello world" ;
	print f (" % s", a + 1) ;
	}
	What is the output of above 'C' program
	(1) Compilation Error (2) Garbage Output
	(3) ello World (4) hello world

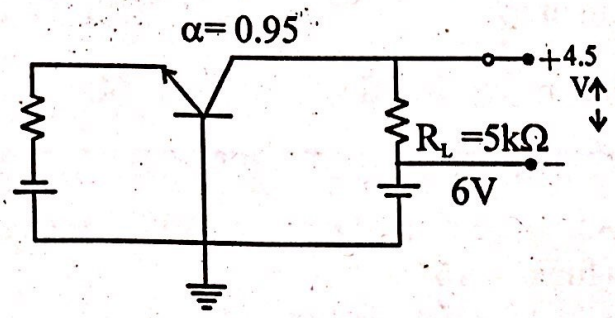
10.	FORTRAN is a (1) High level language (2) Low level language (3) OOP language (4) Machine language

Question No.	Questions
11.	The open loop transfer function of a certain control system is given by $GH = \frac{K}{(S+2)^3}$ for $K > 0$. For what value of gain factor, K, will the root locus of the control system cross the jw-axis. (1) 8 (2) 14 (3) 24 (4) 64
12.	For the above question, the value of the damping factor ξ for a design value of gain factor equal to 8 ? (1) 0.5 (2) 0.3 (3) 0.707 (4) 0.866
13.	A system has 14 poles and 2-zeroes. Its high frequency asymptote in its magnitude plot will have a slope of (1) – 40 dB/decade (2) – 240 dB/decade (3) – 280 dB/decade (4) – 320 dB/decade
14.	Bode plot of a stable system is shown in the following figure. The transfer function of the system is :  (1) $\frac{1}{(S+1)}$ (2) $10/(S+1)$ (3) $\frac{1}{S(S+1)}$ (4) $\frac{10}{s(s+1)}$

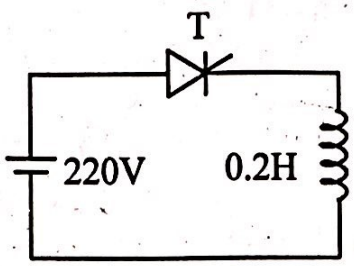
Question No.	Questions
15.	The state transition matrix represents (1) Forced response of the system (2) Free response of the system (3) Transient response of the system (4) None of these
16.	The attenuation of the optical fiber is of the order of (1) 0.01 dB/K_m (2) 0.2 dB/K_m (3) 20 dB/K_m (4) – 40 dB/K_m
17.	The operating frequency corresponding to 1550 nm is (1) 193 THz (2) 19.3 THz (3) 100 THz (4) 300 THz
18.	Which of the following operational mode is likely to produce the shortest pulse width (1) Q-switched (2) Cavity dumped (3) Quasi-CW (4) Mode Locked
19.	In optical communication systems, zero dispersion wavelength is operating at (1) 800 nm (2) 1330 nm (3) 1550 nm (4) 1630 nm
20.	In DWDM technology, the separation between the adjacent channels is of the order of (1) 4 – 6 nm (2) 0.8 nm (3) 0.1 nm (4) 8–10 nm

Question No.	Questions
21.	The octal equivalent of Hexadecimal number 2E.C1 would be (1) 212.602 (2) 56.602 (3) 56.623 (4) 65.302
22.	The complement of complement of $\overline{A}B + A\overline{B}$ will be (1) $AB + \overline{A}\,\overline{B}$ (2) $\overline{A}B$ (3) $\overline{A}B + A\overline{B}$ (4) $\overline{A}B.(\overline{A} + B)$
23.	What is minimum number of 2-input NAND gates required to complement a 2-input OR gate (1) 2 (2) 4 (3) 3 (4) 5
24.	A basic CMOS two input NAND gate requires (1) Two N-channel MOSFETs (2) Two N-Channel & two P-channel MOSFETs (3) Two P-Channel MOSFETs (4) One N-Channel and one P-channel MOSFET
25.	IC 7402 is a – 2 input (1) NAND gate (2) EX-OR gate (3) NOR gate (4) OR Gate
26.	A decoder is nothing but a DEMUX without (1) control inputs (2) data input (3) enable input (4) clock
27.	The size of a PROM needed to implement a dual 8 to 1 MUX with common selection inputs would be (1) 256 K × 2 (2) 512 K × 2 (3) 1024 K × 2 (4) 128 K × 2

Question No.	Questions
28.	Which one of following is not a synchronous input with reference to a flip flop (1) J input in JK flip flop (2) R input in RS flip flop (3) Preset input in JK flip flop (4) D-input in a D flip flop
29.	A counter having a modulus of 64 should have a minimum of (1) Six flip flops (2) Seven flip flops (3) 5 – D – flip flops (4) 64 flip flops
30.	A logic circuit that gives a pulsed waveform at the output for a sinusoidal input (1) Bi stable multivibrator (2) Monostable multivibrator (3) Astable multivibrator (4) Schmitt trigger
31.	Current density in a semiconductor material is given by (1) $J = n \mu_n q/E$ (2) $J = p \mu p\, q/E$ (3) $J = (n \mu_n + p \mu p) . E$ (4) $J = (n \mu_n + p \mu p) / E$
32.	Fermi Level for a P-type semiconductor is given by (1) $E_F = E_V - KT\, ln \frac{N_A}{N_V}$ (2) $E_F = -E_V + KT\, ln \frac{N_A}{N_V}$ (3) $E_F = E_V - K_T\, ln \frac{N_A}{N_V}$ (4) $E_F = E_C - K_T\, ln \frac{N_C}{N_D}$
33.	For conductors the value of Hall coefficient is given by (1) $R_H = \frac{1}{nq}$ (2) $R_H = \frac{nq}{\mu_n}$ (3) $R_H = \frac{\mu_p}{nq}$ (4) $R_H = \frac{n\mu_n + p\mu_p}{q}$

Question No.	Questions
34.	The band gap energy of Ge at 300 $\overset{o}{K}$ is given by (1) $E_g = 0.785$ eV (2) $E_g = 1.121$ eV (3) $E_g = 0.7181$ eV (4) $E_g = 1.212$ eV
35.	Under low level injection assumption, the injected minority current for an extrinsic semiconductor is essentially the (1) Diffusion current (2) Drift current (3) Recombination current (4) Induction current
36.	Ga As has band gap energy of the order of (1) 1.43 eV (2) 0.7 eV (3) 2.4 eV (4) 1.6 eV
37.	Typical value of impurity concentration in a tunnel diode is (1) 1 part in 10^8 parts (2) 1 part in 10^3 parts (3) 1 PPM (4) 1 part in 10 parts
38.	In the given circuit, the value of collector current is :  (1) 0.8 mA (2) 0.9 mA (3) 0.947 mA (4) 0.847 A

Question No.	Questions
39.	MOSFET can be used as a (1) Current controlled capacitor (2) Voltage controlled capacitor (3) Current controlled inductor (4) Voltage controlled inductor
40.	The effective channel length of a MOSFET in saturation decreases with the increase in (1) Gate voltage (2) Drain voltage (3) Source voltage (4) Body voltage
41.	8086 has basic no. of instructions (1) 64 (2) 117 (3) 128 (4) 256
42.	The starting address of an interrupt is called (in 8086 Micro processor) (1) stack pointer (2) program counter (3) interrupt output (4) interrupt vector
43.	In 8086 type O interrupt is reserved for (1) single step (2) NMI (3) Interrupt on overflow (4) Divide Error
44.	For a fully controlled single phase converter supplies power to a resistive load of 10Ω, the input voltage is 230 V, 50 Hz, the value of average output voltage is for $\alpha = 45°$ (1) 276.74 V (2) 376.74 V (3) 176.74 V (4) 76.74 V

Question No.	Questions
45.	Consider the circuit shown. What is the minimum width of gate pulse to ensure turn of the thyristor (I_L = 4 mA).  (1) 2 μs (2) 4 μs (3) 6 μs (4) 8 μs
46.	Snubber circuit is a (1) RL circuit (2) Purely Resistive (3) Purely inductive (4) R - C circuit
47.	Chopper is used for conversion of (1) ac to dc (2) dc to ac (3) ac to ac (4) dc to dc
48.	Class 'C' chopper works in the following quadrants (1) 1st (2) 2nd (3) 1st & 2nd (4) All quadrants
49.	Induction heating is used for (1) Volume heating (2) Plastic packing (3) Plyboard industry (4) Surface heating
50.	For speed control of ac motors following are used (1) Cyclo converters (2) Choppers (3) Rectifiers (4) UJT and SCR

Question No.	Questions
51.	The region of convergence of z-transform of the sequence $\left[\frac{5}{6}\right]^n u(n) - \left[\frac{6}{5}\right]^n u(-n-1)$ is (1) $\lvert z\rvert < 5/6$ (2) $\lvert z\rvert > 5/6$ (3) $\frac{5}{6} < \lvert z\rvert < \frac{6}{5}$ (4) $\frac{6}{5} < \lvert z\rvert < \infty$
52.	The power saving in case of SSB/SC signal as compared to a standard AM signal for modulation index = 0.5 is (1) 94.4 % (2) 23.2 % (3) 56.7 % (4) 75 %
53.	Which of the following suffer (s) from the threshold effect (1) AM detection using envelope detection (2) AM detection using synchronous detection (3) FM detection using a discriminator (4) SSB detection with synchronous detection
54.	A sinusoidal wave of amplitude 10 V and frequency 1kHz is applied to an FM generator having a frequency sensitivity constant of 40 Hz/V, the frequency deviation is (1) 100 Hz (2) 200 Hz (3) 400 Hz (4) 500 Hz
55.	In a VSB system, modulating frequency of 3 MHz results in a sideband power of 25 W. If the carrier power is 100 W, the depth of modulation is (1) 25% (2) 50% (3) 75% (4) 100%

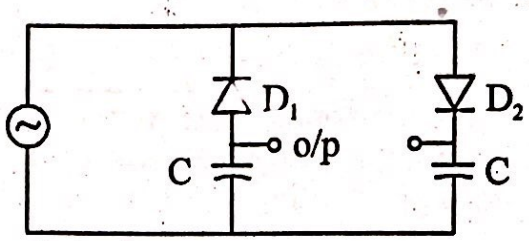
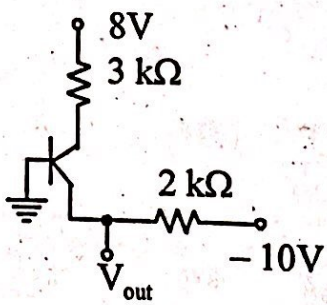
Question No.	Questions
56.	An FM signal is represented by $v(t) = 15 \cos [10^8 \pi t + 6 \sin 2\pi \times 10^3 t]$. The maximum phase deviation in radians are (1) 5 (2) 8 (3) 6 (4) 9
57.	PLL can be used to demodulate (1) PAM signals (2) FM signals (3) PCM (4) DSBSC
58.	PAM signals can be detected by using (1) ADC (2) Integrator (3) Band pass filter (4) High pass filter
59.	The input to a coherent detector is DSBSC signal plus Noise, the noise at the detector output is given by (1) In phase component (2) Quadrature component (3) Zero (4) Envelope
60.	A Hilbert transformer is a (1) Non linear system (2) Non-causal system (3) Time-varying system (4) Low pass system
61.	Three resistances $R_1 = 37$ ohm $\pm$ 5%, $R_2 = 75$ ohm $\pm$ 5%, $R_3 = 50$ ohm $\pm$ 5%, Determine the value of series resistance error if they are connected in series (1) $\pm$ 5% (2) $\pm$ 7.5% (3) $\pm$ 3.5% (4) $\pm$ 8.10%
62.	A 160 $\pm$0% PF capacitor, an inductor of 160 μH and a resistor of 1200 $\pm$10 Ω are connected in series. The value of resonant frequency is (1) 1000 kHz (2) 100 kHz (3) 1.1 MHz (4) 0.9 MHz

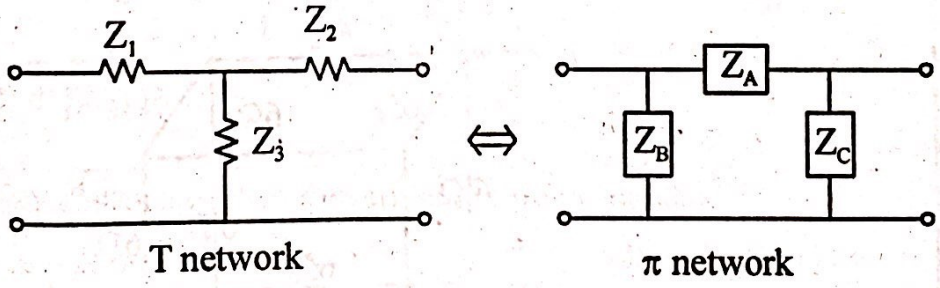
Question No.	Questions
63.	Normal probability curve is denoted by (1) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^2 / 2\sigma^2)$ (2) $\frac{1}{\sigma\sqrt{2\pi}} e^{x/2\sigma^2}$ (3) $\frac{1}{\sigma\sqrt{2\pi}} \exp(-x^2 / 2\sigma^2)$ (4) $\frac{1}{\sigma\sqrt{2\pi}} \exp(x^3 / 2\sigma^3)$
64.	Relative static error may be defined as (1) $\frac{\text{true value}}{\text{Absolute Error}}$ (2) $\frac{\text{true value} - \text{Absolute Error}}{\text{true value}}$ (3) $\frac{\text{Absolute Error}}{\text{true value} + \text{Absolute Error}}$ (4) $\frac{\text{Absolute Error}}{\text{true value}}$
65.	Static sensitivity at an operating point is given by (1) $\frac{\text{infinitesimal change in the output}}{\text{infinitesimal change in the input}}$ (2) $\frac{\text{infinitesimal change in the input}}{\text{infinitesimal change in the output}}$ (3) $\frac{\text{true value}}{\text{Absolute value}}$ (4) $\frac{\text{Absolute value}}{\text{true value}}$
66.	The input impedance of a cathode ray oscilloscope is of the order of (1) 10 Ω (2) Mega ohms (3) Kilo ohms (4) fraction of 1 ohms

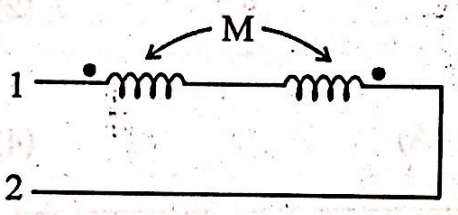
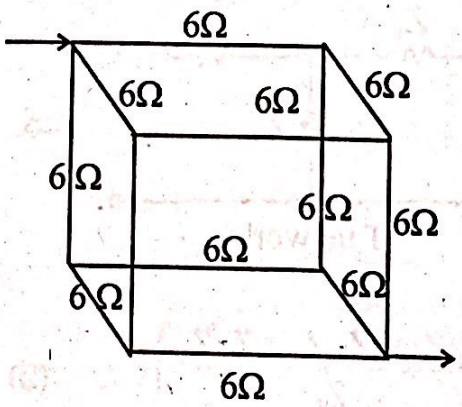
Question No.	Questions
67.	The mean deviation $\overline{D}$ in terms of deviations from the mean value of n readings is (1) $\frac{\sum \lvert d \rvert}{n}$ (2) $\sqrt{\sum d^2/n}$ (3) $\sum d/n$ (4) $\sqrt{\frac{\sum d^2}{n}}$
68.	The transfer function of a system is $G(s) = \frac{100\, e^{-st}}{s(s+10)}$, the system (1) is a linear system (2) is a nonlinear system (3) has a transportation lag (4) None of the above
69.	8086 microprocessor has address bus of (1) 16 bits (2) 24 bits (3) 20 bits (4) 8 bits
70.	8086 has a bus cycle of at least (1) 4 clock periods (2) 2 clock periods (3) 3 clock periods (4) None of these
71.	Poisson's equation is given by (1) $\nabla . D = 0$ (2) $\nabla^2 V = 0$ (3) $\nabla^2 V = -\frac{\rho}{\epsilon}$ (4) $\nabla^2 V = \rho/\epsilon_0$
72.	The total flux of a closed surface is equal to the net charge enclosed within the surface. This statement is an expression of (1) Divergence Theorem (2) Gauss's Law (3) Faraday Law (4) Maxwells equations

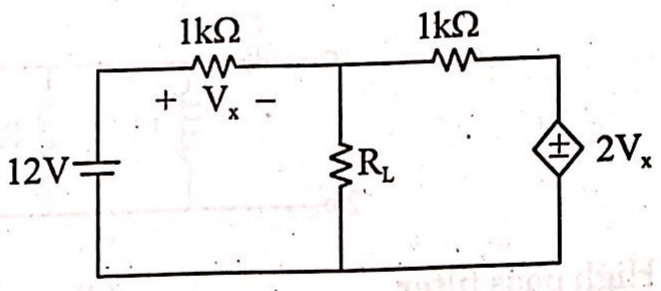
Question No.	Questions
73.	The divergence of a vector $\overline{A} = x\,\hat{a}x + y\,\hat{a}y + z\,\hat{a}z$ is (1) 0 (2) $\frac{1}{3}$ (3) 1 (4) 3
74.	Which of the following expression is true for a perfect dielectric (1) $\sigma >> w\epsilon$ (2) $\sigma = w\epsilon$ (3) $\sigma << w\epsilon$ (4) $\sigma = \sqrt{w\epsilon}$
75.	Given that σ = 38 m S/m & $\mu_r = 1$ for aluminium, the skin depth at a frequency of 2 MHz would be equal to (1) 64.5 nm (2) 64.5 μm (3) 57.7 nm (4) 57.77 μm
76.	The power density of solar radiation at a place is 1.2 $\frac{kW}{m^2}$. The approximate value of electric field corresponding to the incident solar power is given by (1) 950 V/m (2) 750 V/m (3) 450 V/m (4) 475 V/m
77.	A plane wave in air impinges at 45° on a loss less dielectric. The transmitted wave propagates at an angle 30° with respect to the normal. The value of dielectric constant of the dielectric is (1) 2.5 (2) 2.0 (3) 3.0 (4) 4.0
78.	A plane wave travelling in a free space is incident normally on a medium having $\epsilon_r = 4.0$. The fraction of power transmitted in to the medium is given by (1) $\frac{8}{9}$ (2) $\frac{1}{2}$ (3) $\frac{1}{3}$ (4) $\frac{5}{6}$

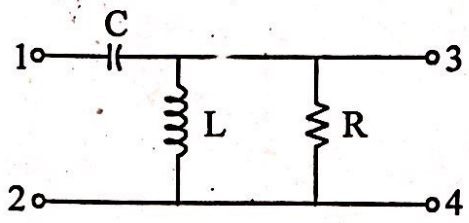
Question No.	Questions
79.	A metallic waveguide can be considered as a (1) low pass filter (2) high pass filter (3) band pass filter (4) band reject filter
80.	A 10 GHz wave is propagating in a waveguide having a wall separation of 4 cm. The largest number of half waves of electric intensity possible in the waveguide is (1) 1 (2) 3 (3) 2 (4) 4
81.	For a common base BJT, having $I_e = 5$ mA and $\alpha = 0.97$ an AC signal of 5 mV is applied between the base and the emitter terminals. The input impedance is given by (1) 5.2 Ω (2) 6 Ω (3) 4.9 Ω (4) 6.7 Ω
82.	The typical value of h_f for common base BJT is (1) 50 – 250 (2) – 50 (3) – 1 (4) 25
83.	If the source resistance, the output resistance of emitter follower using the simplified hybrid model would be (1) $\frac{h_{ie} + R_s}{1 + h_{fe}}$ (2) $\frac{h_{ie} + R_s}{h_{fe}}$ (3) $R_S + \frac{1}{h_{oe}}$ (4) $\frac{1}{h_{oe}}$
84.	The ripple factor is given by (1) $\sqrt{\left(\frac{I_{rms}}{I_{dc}}\right)^2 - 1}$ (2) $\left(1 - \sqrt{\frac{I_{rms}}{I_d}}\right)^2$ (3) $\frac{I_{rms}}{I_{dc}}$ (4) $\frac{I_{dc}}{I_{rms}}$

Question No.	Questions
85.	Following circuits is given by :  (1) Bridge rectifier (2) Ring modulator (3) Frequency discriminator (4) Voltage doubler
86.	For a transistor amplifier to be inherently stable against thermal run away, the condition is (1) $V_{CE} > \frac{V_{CC}}{2}$ (2) $V_{CE} < \frac{V_{CC}}{2}$ (3) $V_{CE} = \frac{V_{CC}}{2}$ (4) $V_{CE} = 1.5\, V_{CC}$
87.	For the circuit given the value of V_{out} is :  (V_{BE} = 0.7V) (1) +5.14 V (2) – 6.14 V (3) – 5.14 V (4) + 6.14 V

Question No.	Questions
88.	The gain of a transistor amplifier falls at high frequency due to the (1) internal capacitance of the device (2) coupling capacitor at the input (3) skin effect (4) coupling capacitor at the output
89.	The effect of negative feedback on Noise is (1) $\frac{N}{1-\beta A}$ (2) $N(1-\beta A)$ (3) $N(1+\beta A)$ (4) $\frac{N}{1+\beta A}$
90.	Cross-over distortion behaviour is a characteristics of (1) Class – A output stage (2) Class – B output stage (3) Class – AB output stage (4) Common base output stage
91.	T to π transformation gives the value of $Z_C \Rightarrow$  T network π network (1) $\left(Z_C = \frac{Z_1 Z_2 + Z_2 Z_3 + Z_1 Z_3}{Z_1}\right)$ (2) $Z_C = \frac{Z_A Z_B}{Z_A + Z_B + Z_C}$ (3) $Z_C = \frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_A Z_C + Z_B Z_C}$ (4) $Z_C = \frac{Z_1 Z_2 Z_3}{Z_1 + Z_2 + Z_3}$

Question No.	Questions
92.	In the above question π to T conversion gives the value of Z_1 (1) $\frac{Z_B Z_C}{Z_A + Z_B + Z_C}$ (2) $\frac{Z_A + Z_B + Z_C}{Z_A Z_B + Z_B Z_C + Z_C Z_A}$ (3) $\frac{Z_1 + Z_2}{Z_1 + Z_2 + Z_3}$ (4) $\frac{Z_A Z_B}{Z_A + Z_B + Z_C}$
93.	The equivalent inductance of the following is given by  (1) $L_1 + L_2 + M$ (2) $L_1 + L_2 - M$ (3) $L_1 + L_2 + 2M$ (4) $L_1 + L_2 - 2M$
94.	Every arm of the cube has a resistance of 6 ohms. The equivalent resistance of the cube is given by  (1) 36 Ω (2) 12 Ω (3) 10 Ω (4) 5 Ω

Question No.	Questions
95.	In the following circuit, the value of R_L is given by  (1) 0.5 kΩ (2) 250 Ω (3) 1 kΩ (4) 2k Ω
96.	Series RLC circuit has a resonant frequency of 1 MHz and a quality factor of 100, if the values of R, L, C are doubled, what is the new value of Q ? (1) 25 (2) 50 (3) 100 (4) 200
97.	In a series RLC circuit R = 2kΩ, L = 1H, C = $\frac{1}{400}$ μF, The resonant frequency is (1) 2×10^4 Hz (2) $\frac{10^4}{\pi}$ Hz (3) 10 kHz (4) 20π kHz
98.	For a 2-port network to be reciprocal, following is true (1) $Z_{11} = Z_{22}$ and $Y_{11} = Y_{22}$ (2) $Y_{21} = Y_{12}$ & $h_{21} = -h_{12}$ (3) $AD - BC = 0$ (4) $AB - CD = 0$

Question No.	Questions
99.	The network shown behaves like a  (1) High pass filter (2) LPF (3) BPF (4) Band stop filter
100.	If the scattering matrix [S] of a two port network is $[S] = \begin{bmatrix} 0.2\angle 0^\circ & 0.9\angle 90^\circ \\ 0.9\angle 90^\circ & 0.1\angle 90^\circ \end{bmatrix}$ then the network is (1) lossless and reciprocal (2) lossless but non reciprocal (3) lossy but reciprocal (4) neither lossy nor reciprocal

Maharshi Dayanand University Rohtak

Deptt. of ECG

M. Phil/ PhD/URS Entrance Examination Answer Key

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

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M. Phil/ PhD/URS Entrance Examination Answer Key

Sr. No.	Set-A	Set-B	Set-C	Set-D
51	D	A	B	C
52	A	B	C	A
53	B	A	C	C
54	B	A	B	C
55	B	D	C	D
56	B	B	B	C
57	A	C	B	B
58	D	A	C	B
59	B	D	A	A
60	C	B	D	A
61	C	C	C	A
62	A	B	B	A
63	C	D	D	C
64	C	C	C	D
65	D	D	D	A
66	C	A	C	B
67	B	B	A	A
68	B	A	D	C
69	A	B	C	C
70	A	C	A	A
71	C	C	A	C
72	B	A	A	B
73	D	C	C	D
74	C	C	D	C
75	D	D	A	D
76	C	C	B	A
77	A	B	A	B
78	D	B	C	A
79	C	A	C	B
80	A	A	A	C
81	A	A	C	A
82	A	D	A	B
83	C	D	A	A
84	D	D	C	A
85	A	B	A	D
86	B	B	A	B
87	A	B	C	C
88	C	B	B	A
89	C	A	B	D
90	A	C	B	B
91	B	A	D	A
92	D	A	A	D
93	D	C	B	D
94	C	D	B	D
95	B	A	B	B
96	D	B	B	B
97	D	A	A	B
98	C	C	D	B
99	D	C	B	A
100	A	A	C	C

20/11/18 20.11.18 20/11/18