Test Booklet Code & Serial No. **C**

प्रश्नपत्रिका कोड व क्रमांक

Paper-II

ELECTRONIC SCIENCE

Signature and Name of Invigilator

1. (Signature) ....

(Name) ....

2. (Signature) ....

(Name) ....

Seat No. | | | | | | | |

(In figures as in Admit Card)

Seat No. ....

(In words)

OMR Sheet No. | | | | | | | |

(To be filled by the Candidate)

SEP - 38221

Time Allowed : 2 Hours] **[Maximum Marks : 200**

Number of Pages in this Booklet : **32** Number of Questions in this Booklet : **100**

Instructions for the Candidates

1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
2. This paper consists of **100** objective type questions. Each question will carry *two* marks. *All* questions of Paper II will be compulsory.
3. At the commencement of examination, the question booklet will be given to the student. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as follows :
   (*i*) To have access to the Question Booklet, tear off the paper seal on the edge of this cover page. Do not accept a booklet without sticker-seal or open booklet.
   (*ii*) Tally the number of pages and number of questions in the booklet with the information printed on the cover page. Faulty booklets due to missing pages/questions or questions repeated or not in serial order or any other discrepancy should not be accepted and correct booklet should be obtained from the invigilator within the period of 5 minutes. Afterwards, neither the Question Booklet will be replaced nor any extra time will be given. The same may please be noted.
   (*iii*) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
4. Each question has four alternative responses marked (A), (B), (C) and (D). You have to darken the circle as indicated below on the correct response against each item.
   Example : where (C) is the correct response.
   (A) (B) ● (D)
5. Your responses to the items are to be indicated in the **OMR Sheet given inside the Booklet only.** If you mark at any place other than in the circle in the OMR Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done at the end of this booklet.
8. If you write your Name, Seat Number, Phone Number or put any mark on any part of the OMR Sheet, except for the space allotted for the relevant entries, which may disclose your identity, or use abusive language or employ any other unfair means, you will render yourself liable to disqualification.
9. You have to return original OMR Sheet to the invigilator at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are, however, allowed to carry the Test Booklet and duplicate copy of OMR Sheet on conclusion of examination.
10. Use only Blue/Black Ball point pen.
11. Use of any calculator or log table, etc., is prohibited.
12. There is no negative marking for incorrect answers.

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

1. परिक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
2. सदर प्रश्नपत्रिकेत 100 बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे.
3. परीक्षा सुरू झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनीटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात.
   (*i*) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
   (*ii*) पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून पहावी. पृष्ठे कमी असलेली/कमी प्रश्न असलेली/प्रश्नांचा चुकीचा क्रम असलेली किंवा इतर त्रुटी असलेली सदोष प्रश्नपत्रिका सुरुवातीच्या 5 मिनिटातच पर्यवेक्षकाला परत देऊन दुसरी प्रश्नपत्रिका मागवून घ्यावी. त्यानंतर प्रश्नपत्रिका बदलून मिळणार नाही तसेच वेळही वाढवून मिळणार नाही याची कृपया विद्यार्थ्यांनी नोंद घ्यावी.
   (*iii*) वरीलप्रमाणे सर्व पडताळून पाहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
4. प्रत्येक प्रश्नासाठी (A), (B), (C) आणि (D) अशी चार विकल्प उत्तरे दिली आहेत. त्यातील योग्य उत्तराचा रकाना खाली दर्शविल्याप्रमाणे ठळकपणे काळा/निळा करावा.
   उदा. : जर (C) हे योग्य उत्तर असेल तर.
   (A) (B) ● (D)
5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत.** इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
8. जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणा व्यतिरीक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूण केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमार्गांचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापि, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
10. फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.
11. कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.
12. चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.

Electronic Science
Paper II

Time Allowed : 120 Minutes] **[Maximum Marks : 200**

Note : This Paper contains **Hundred (100)** multiple choice questions. Each question carrying **Two (2)** marks. Attempt *All* questions.

1. The Program Counter is a :
   (A) 16-bit upcounter with parallel load
   (B) 8-bit up/down counter
   (C) 16-bit down counter with parallel load
   (D) 16-bit Shift Register with parallel load

2. The register which acts as an operand and destination of result for arithmetic operations is .... and the status of result is stored, is ....
   (A) B, C
   (B) C, D
   (C) D, A
   (D) A, PSW

3. Advantage of segmented addressing is :
   (A) Size of segment is fixed
   (B) Size of segment is variable
   (C) Used in pipelining
   (D) Supports DMA

4. The effective address, if segment register is 3000 and offset is 2020 will be :
   (A) 30002
   (B) 32020
   (C) 05020
   (D) 23020

5. The 8086 is a .... processor with .... architecture.

(A) 8 bit, Von Neumann

(B) 16 bit, Harvard

(C) 16 bit, Pipelined

(D) 16 bit, Von Neumann

6. The TH_0 and TL_0 registers of 8051 are loaded with 05 H and has 1 MHz clock input in auto-reload mode, to generate a square wave. The frequency of the square wave will be approximately :

(A) 1 kHz

(B) 2 kHz

(C) 50 kHz

(D) 20 kHz

7. On power up, the 8051 uses following locations in the RAM for registers $R_o - R_I$ and bit addressable memory :

(A) 00 – 2F and 2F – 30

(B) 00 – 7F and 7F – FF

(C) 00 – 07 and 20 – 2F

(D) 30 – 7F and 20 – 2F

8. The *correct* sequence of steps for instruction execution is :

(A) Decode, opcode fetch and execute

(B) Execute, decode, opcode fetch

(C) Opcode fetch, decode, execute

(D) Decode, execute, opcode fetch

9. Match List I with List II and select the *correct* answer using the codes given below :

List I

(*a*) Register addressing

(*b*) Immediate addressing

(*c*) Relative addressing

(*d*) Indexed addressing

List II

(*i*) MOVC A, @ A + PC

(*ii*) DJNZ R2, LOOP

(*iii*) MOV A, # 55H

(*iv*) MOV A, R1

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*i*)	(*ii*)	(*iii*)	(*iv*)
(B)	(*iv*)	(*iii*)	(*ii*)	(*i*)
(C)	(*iii*)	(*ii*)	(*iv*)	(*i*)
(D)	(*iv*)	(*iii*)	(*i*)	(*ii*)

10. **Assertion (A) :**

$IO/\overline{M}$ pin is used to access memory.

Reason (R) :

In memory mapped I/O the input/output ports are accessed as memory.

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)

(B) Both (A) and (R) are true but (R) is not correct explanation of (A)

(C) (A) is true but (R) is false

(D) (A) is false but (R) is true

11. Which is the final step in wafer processing sequence ?

(A) Photolithography

(B) Chemical vapor

(C) Metallization

(D) Oxidation

12. When the input of the CMOS inverter is equal to 'Inverter Threshold Voltage' V^{th}, the transistors are operating in :

(A) N-MOS is cut-off, P-MOS is in saturation

(B) P-MOS is cut-off, n-MOS is in saturation

(C) Both the transistors are in linear region

(D) Both the transistors are in saturation region

13. **Assertion (A) :**

CMOS inverter is more power efficient compared to regular resistor-MOSFET inverter.

Reason (R) :

The dynamic power consumption of a CMOS inverter increases with increasing switching frequency.

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(C) (A) is true but (R) is false

(D) (A) and (R) both are false

14. Match List I with List II and select the *correct* answer using the codes given below :

List I

(*a*) Very low static power consumption

(*b*) Image data storage

(*c*) Reducing device dimensions

(*d*) Planning of layout

List II

(*i*) Scaling

(*ii*) Stick diagram

(*iii*) CMOS

(*iv*) CCD

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*i*)	(*iii*)	(*ii*)	(*iv*)
(B)	(*iv*)	(*ii*)	(*i*)	(*iii*)
(C)	(*i*)	(*iv*)	(*ii*)	(*iii*)
(D)	(*iii*)	(*iv*)	(*i*)	(*ii*)

15. With help of Scanning Electron Microscope (SEM) one can resolve objects as small as :

(A) 10 mm

(B) 1 micron

(C) 10 nm

(D) 1 nm

16. Which of the following represents a transistor in stick diagram of VLSIs ?

(A) Black Crossing Blue

(B) Red Crossing Brown

(C) Red Crossing Green

(D) Blue Crossing Green

17. Drift velocity of carriers in semiconductor device having electric field strength E is given by :

(A) $\mu.E$

(B) E/μ

(C) μ/E

(D) 2.E

18. Which one of the following is not an advantage of CMOS technology over NMOS ?

(A) Very low static power consumption

(B) High density of logic functions on a chip

(C) Less number of fabrication steps

(D) High noise immunity

19. IoT uses which of the following modules in appropriate sequence :

(A) Cloud storage, Data analysis, Sensors, Data Acquisition

(B) Sensor, Data Acquisition, Communication, Cloud storage

(C) Data Acquisition, Data analysis, Cloud storage, Communication

(D) Communication, Data Acquisition, Cloud storage, Sensor

20. Correlation of

$x(n) = (1, \underset{\uparrow}{2}, 1)$ and $y(n) = (1, 2, -1)$

will be :

(A) {1, 4, 2, –4, 1}

(B) {–1, 0, 4, 3, 1}

(C) {1, 4, 2, 1, 4}

(D) {–1, 2, 4, –2, 1}

21. MST RADAR is used for :

(A) Measuring speed of automobiles

(B) Mapping the ground

(C) Searching surface non-uniformities

(D) Finding attitude of cloud base

22. High frequency resistance of an antenna of length 'l', cross-section 'A', conductivity 'σ', perimeter 'P' (μ_0 is free space permeability, ω is operating frequency) is given by :

(A) $l/\mathrm{P} \sqrt{\dfrac{\omega\mu_0}{2\sigma}}$ ohms

(B) $l/2\mathrm{P}\sigma\sqrt{\omega\mu_0}$ ohms

(C) $l/\mathrm{P}\sigma\sqrt{\omega\mu_0}$

(D) $\dfrac{l}{2\sigma}\sqrt{\dfrac{\omega\mu_0}{\mathrm{P}}}$

23. Circular polarization of EM wave means electric and magnetic field must have :

(A) Either electric or magnetic non-zero and positive propagation vector

(B) Two orthogonal linear components with real magnitude and phase difference in even multiples of 90°

(C) Two orthogonal linear components with same magnitude and phase difference in odd multiples of 90°

(D) Both components non-zero and perpendicular to the direction of propagation

24. If the length of a linear dipole antenna ($l << \lambda$), A_o is peak value of power density, r is radius, $\hat{a}$ is radial unit vector, θ is usual spherical co-ordinate, then the radiated power density is given by :

(A) $\hat{a}\, A_o^2 \sin^2 \theta / r^2$

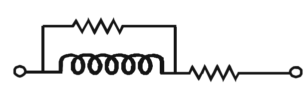
(B) $\hat{a}\, A_o \sin^2 \theta / r^2$

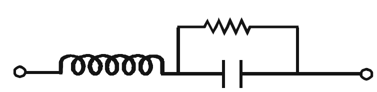
(C) $\hat{a}\, A_o \sin \theta / r^2$

(D) $\hat{a}\, A_o^2 \sin \theta / r$

25. Electrical model of PIN diode in microwave region can be given as below for forward bias :

(A) 

(B) 

(C) 

(D) 

26. Which of the following microwave devices falls under transfer electron device principle ?

(A) Klystron

(B) TWT

(C) Gunn diode

(D) Magnetron

27. If 1 is transmit antenna and 2 is receive antenna, the Z_{21} (mutual impedance between antenna 1 and 2) is given by :

(A) $\left.\frac{V_{1oc}.V_{2\,oc}}{I_2}\right|_{I_1=0}$

(B) $\left.\frac{V_{2\,oc}}{I_1}\right|_{I_2=0}$

(C) $\left.\frac{V_{1oc}}{V_{2\,oc}.I_1}\right|_{I_2=0}$

(D) $\left.\frac{V_{2\,oc}}{V_{1\,oc}} \times \frac{1}{I_2}\right|_{I_1=0}$

28. The maximum contribution to ionosphere is given by the following :

(A) gamma-ray radiation

(B) cosmic radiation

(C) ultra-violet spectrum

(D) Beta radiation

29. Cut-off wavelength for TE_{01} mode for a ractangular wave guide with cross-section $a \times b$ (where 'a' is the broader side) is given by :

(A) $2b$

(B) a

(C) $2a$

(D) b

30. The property of Faraday rotation in the ferrite material is used by which of the following ?

(1) Circulators

(2) Isolators

(3) Directional coupler

(4) Magic Tee

Codes :

(A) (1) and (3)

(B) (2) and (4)

(C) (1) only

(D) (1) and (2)

31. Slope overload distortion in delta modulation can be reduced by :

(A) Decreasing sample rate

(B) Decreasing the step size

(C) Increasing the differential gain

(D) Increasing the step size

32. A communication channel with AWGN having SNR >>1 and bandwidth B has capacity C_1, if the SNR and bandwidth B is :

(A) $C_2 = C_1 + 2B$

(B) $C_2 = 2 (C_1 + B)$

(C) $C_2 = C_1 + B$

(D) $C_2 = 4 (C_1 + B)$

33. Two frequencies 12 kHz and 14 kHz sinusoidal in nature are added together and given to the ideal frequency detector in demodulation. The output of the detector is :

(A) 12 kHz

(B) 2 kHz

(C) 12 kHz and 14 kHz

(D) 14 kHz

34. An AM has carrier frequency and modulating signal frequency 2 MHz and 2 kHz respectively. An appropriate value for the time constant of the envelope detector in demodulator is :

(A) 0.08 μs

(B) 40 μs

(C) 120 μs

(D) 0.10 μs

35. In PSK modulator :

(*a*) QPSK utilizes four distinct levels of phase shift

(*b*) QPSK signal is equivalent to two BPSK signal, but with the carriers 90° out of phase with one another

(*c*) QPSK utilizes four distinct levels of amplitude and phase shift

Options :

(A) (*a*) and (*c*)

(B) (*a*) and (*b*)

(C) (*c*) only

(D) (*b*) only

36. For avoiding any alterations due to gravity, the blood pressure measurement is always done :

(A) When the patient is on the move

(B) When the patient is lying on bed

(C) When the patient is standing

(D) On the right leg

37. Data sequence "1101100001" transmitted at a speed of 1,00,000 bits/sec with a carrier frequency of 150 kHz corresponds to .... two-bit symbols/sec.

(A) 30,000

(B) 50,000

(C) 1,00,000

(D) 25,000

38. Match List I with List II and select the *correct* answer using the codes given below :

List I

(*a*) TDM

(*b*) FM

(*c*) AM

(*d*) FDM

List II

(*i*) Frequency detector

(*ii*) Envelope detector

(*iii*) Sensitive to propagation delay

(*iv*) Non-sensitive to propagation delay

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iii*)	(*i*)	(*ii*)	(*iv*)
(B)	(*iii*)	(*ii*)	(*i*)	(*iv*)
(C)	(*ii*)	(*iii*)	(*iv*)	(*i*)
(D)	(*ii*)	(*i*)	(*iv*)	(*iii*)

39. Capacity of communication channel can be increased by :

(*a*) Decreasing signal to noise ratio

(*b*) Decreasing the bandwidth

(*c*) Decreasing the noise in channel

(*d*) Increasing signal to noise ratio

Codes :

(A) (*a*) and (*d*)

(B) (*b*) and (*c*)

(C) (*a*) only (*b*)

(D) (*c*) and (*d*)

40. **Assertion (A) :** Thermal noise is sometimes referred to as white noise.

Reason (R) : When the white noise is passed through a network, the spectral density will be altered by the shape of the network frequency response.

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(C) (A) is true but (R) is false

(D) (A) is false and (R) is true

41. *di/dt* protection is provided to the thyristor by :
   (A) Connecting an inductor in parallel across the load
   (B) Connecting an inductor in series with the load
   (C) Connecting an inductor in parallel across the gate terminal
   (D) Connecting an inductor in series with the gate

42. The local hot spot formation in the cross-section of the SCR is avoided by :
   (A) Reducing the junction temperature
   (B) Applying gate current nearer to the maximum gate current
   (C) Using only R loads
   (D) Proper mounting of the SCR on heat sink

43. *dv/dt* protection is provided to the SCR by :
   (A) Connecting a capacitor in parallel with the load
   (B) Connecting an inductor in series with the load
   (C) Connecting a capacitor and resistor in parallel with the device
   (D) Connecting an inductor and resistor in parallel with the device

44. What is the absolute maximum operating/switching frequency of a converter grade thyristor (SCR) whose turn-on and turn-off time are 3 μs and 200 μs respectively ?
   (A) 5.00 kHz
   (B) 4.9 kHz
   (C) 10.0 kHz
   (D) 20.0 kHz

45. Match the following :

Set I

(*a*) Phase controlled converter

(*b*) Chopper

(*c*) Inverter

(*d*) Dimmerstat

Set II

(*i*) DC to DC conversion

(*ii*) DC to AC conversion

(*iii*) AC to AC conversion

(*iv*) AC to DC conversion

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iv*)	(*iii*)	(*ii*)	(*i*)
(B)	(*iv*)	(*i*)	(*ii*)	(*iii*)
(C)	(*iv*)	(*ii*)	(*iii*)	(*i*)
(D)	(*i*)	(*ii*)	(*iii*)	(*iv*)

46. Lithium niobate is a combination of :

(A) Electro-optic, piezo-electric and optical properties

(B) Piezo-electric and optically active properties

(C) Optical and mechanical properties

(D) Piezo-electric properties and chemical properties

47. Rayleigh scattering is a fundamental loss mechanism arising from :

(A) Electrical fluctuations

(B) Mechanical fluctuations

(C) Electronic fluctuations

(D) Local microscopic fluctuations

48. Silica fibres can change their optical properties permanently when they are exposed to :

(A) Electrical shocks

(B) High power electrostatic shock

(C) Intense radiation from a laser operating in blue/ultraviolet spectrum

(D) Intense radiation from a laser operating in a red and green spectrum

49. The bandwidth of a photodetector is defined as :

(A) $[2\pi(\tau_{tr} + \tau_{RC})] - 1$

(B) $[2\pi(\tau_{tr} + \tau_{RC})]^{-1}$

(C) $2\pi(\tau_{tr} + \tau_{RC})$

(D) $(2\pi(\tau_{tr} + \tau_{RC}) + 1)^{-1}$

50. Match the pairs :

Set I

(*a*) P-i-n diode

(*b*) Optical flip-flop

(*c*) Fibre laser Transmitter

(*d*) Grating

Set II

(*i*) WDM components

(*ii*) Photodetector

(*iii*) High speed communication

(*iv*) Semiconductor laser and amplifier

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*ii*)	(*iv*)	(*iii*)	(*i*)
(B)	(*ii*)	(*iv*)	(*iii*)	(*i*)
(C)	(*iii*)	(*ii*)	(*i*)	(*iv*)
(D)	(*iv*)	(*iii*)	(*ii*)	(*i*)

51. MEMS are minitiarised to microscopic level and therefore have :

(A) Low sensitivity

(B) Large dynamic range

(C) Very low frequency response

(D) High mechanical strength

52. What is the sensitivity of a 200 μA meter movement for a DC voltmeter :

(A) 10 kΩ/V

(B) 1 kΩ/V

(C) 5 kΩ/V

(D) 2.5 kΩ/V

53. An integrator contains 100 kΩ and 1 μF capacitor. If the voltage applied to the integrator is 1 Volt, what is the output of the integrator after 1 sec ?

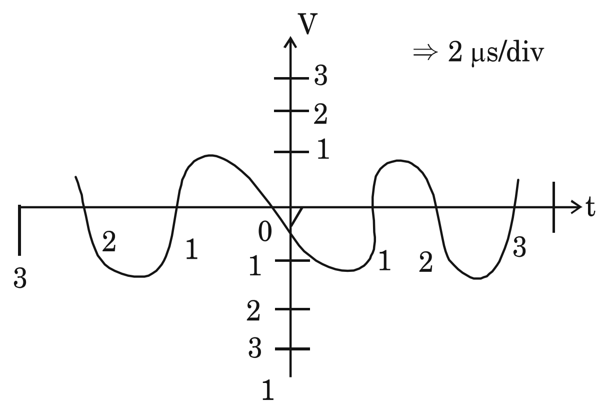
(A) 10 V

(B) 5 V

(C) 15 V

(D) 0 V

54. If the time/div control is set to 2μs/div, determine the frequency of the wave form shown in figure below :



(A) 100 kHz

(B) 50 kHz

(C) 150 kHz

(D) 125 kHz

55. Match the pairs :

Set I

(*a*) Piezo-electric

(*b*) Foil strain gauge

(*c*) Beta gauge

(*d*) LVDT

Set II

(*i*) Temperature measurement

(*ii*) Displacement measurement

(*iii*) Pressure measurement

(*iv*) Thickness measurement

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iv*)	(*iii*)	(*ii*)	(*i*)
(B)	(*iii*)	(*iv*)	(*i*)	(*ii*)
(C)	(*iii*)	(*i*)	(*iv*)	(*ii*)
(D)	(*i*)	(*ii*)	(*iii*)	(*iv*)

56. Match the pairs :

Set I

(*a*) Gear train rotational transformer

(*b*) Tachometer velocity sensor

(*c*) DC amplifier

(*d*) Acceleration sensor

Set II

(*i*) $V_2\ (s) = K_t\ w\ (s)$

(*ii*) $\theta_L = n\,\theta_m$ or $w_L = nw_n$

(*iii*) $\dfrac{X_o(s)}{X_m(s)} = -s^2 \Big/ \left(s^2 + \left(\dfrac{b}{m}\right)s + \dfrac{k}{m}\right)$

(*iv*) $Ka \big/ (S\tau + 1)$

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*ii*)	(*i*)	(*iv*)	(*iii*)
(B)	(*ii*)	(*iv*)	(*iii*)	(*i*)
(C)	(*i*)	(*ii*)	(*iii*)	(*iv*)
(D)	(*iv*)	(*iii*)	(*ii*)	(*i*)

57. A good control system has the following features, *except* :

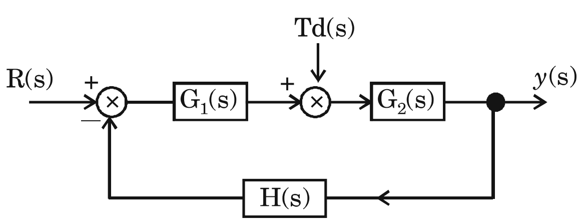
(A) Good stability

(B) A simple system

(C) Good accuracy

(D) Sufficient power handling

58. The transfer function $y(s)/\mathrm{T}d(s)$ for the following system (shown in fig) is :



(A) $\dfrac{y(s)}{\mathrm{T}d\,(s)} = 1 - \dfrac{\mathrm{G}(s)}{[1 - \mathrm{G}_1(s)\,\mathrm{G}_2(s)\,\mathrm{H}(s)]}$

(B) $\dfrac{y(s)}{\mathrm{T}d\,(s)} = 0$

(C) $\dfrac{y(s)}{\mathrm{T}d\,(s)} = \dfrac{\mathrm{G}(s)}{[1 - \mathrm{G}_1(s)\,\mathrm{G}_2(s)\,\mathrm{H}(s)]}$

(D) $\dfrac{y(s)}{\mathrm{T}d\,(s)} = \dfrac{\mathrm{G}(s)}{[1 + \mathrm{G}_1(s)\,\mathrm{G}_2(s)\,\mathrm{H}(s)]}$

59. The minimum number of states required to describe the two degree differential equation :

(A) 1

(B) 2

(C) 3

(D) 4

60. The transfer function $y(\mathrm{s})/\mathrm{U}(\mathrm{s})$ of a system described by the state equations $d\mathrm{X}/dt = -2\ \mathrm{X} + 24$ and $y(t) = 0.5x$ is :

(A) 0.5/(s – 2)

(B) 1/(s – 2)

(C) 0.5/(s + 2)

(D) 1/(s + 2)

61. A Si n-p-n bipolar transistor has the following parameters collector current I_c = 6 mA, common emitter current gain factor h_{FE} = 120, operational temperature T = 300°K. Determine the mutual conductance of small signal transistor.

(A) 0.23 mho

(B) 0.02 mho

(C) 2.3 mho

(D) 4.33 mho

62. When an electron is thermally excited to conduction band in semiconductor, an electron is surrounded by :

(A) a very less number of occupied energy state

(B) a very less number of unoccupied energy state

(C) a large number of unoccupied energy states

(D) a large number of occupied energy states

63. n-channel MOSFET is preferred than p-channel MOSFET because :

(A) input impedance of n-channel is higher than the input impedance of p-channel MOSFET

(B) input impedance of p-channel is higher than the input impedance of n-channel MOSFET

(C) the electron mobility in Si is smaller than the mobility of holes

(D) the electron mobility in Si is larger than the mobility of holes

64. For a p-type material the Fermi level :

(A) lies at the middle of Fermi region

(B) lies near the valence band

(C) lies near the conduction band

(D) lies in the conduction band

65. Mobility of electrons for Silicon (intrinsic) at 300 K is :

(A) 1350 cm^2/s

(B) 3900 cm^2/s

(C) 5000 cm^2/s

(D) 8500 cm^2/s

66. Distribution of implanted impurity ions by Ion implantation method is :

(A) Parabolic

(B) Gaussian

(C) Random

(D) Constant

67. Which of the following is *correct* for BJT ?

(A) Emitter injection efficiency is made close to unity by doping the emitter much higher than the base

(B) Emitter injection efficiency is made close to unity by doping the base much higher than the emitter

(C) Emitter injection efficiency can be improved by the use of larger band gap emitter than in the base

(D) Emitter injection efficiency is independent of doping profile at either base or emitter

68. Typical value of impurity concentration in a Tunnel diode is :

(A) 1 part in 10^{10} parts

(B) 1 part in 10^{8} parts

(C) 1 part in 10^{6} parts

(D) 1 part in 10^{3} parts

69. A Zener diode when used in voltage stabilisation circuits is biased in :

(A) Reverse-bias region below the breakdown voltage

(B) Reverse-breakdown region

(C) Forward-biased region

(D) Forward biased constant current mode

70. Match List I with List II and select the *correct* answer using the codes given below :

List I

(*a*) Donor energy band

(*b*) Fermi level of *p*-type semiconductor at room temperature

(*c*) Acceptor energy band

(*d*) Fermi level in intrinsic semiconductor

List II

(1) At the middle of the forbidden energy gap

(2) Close to the conduction band

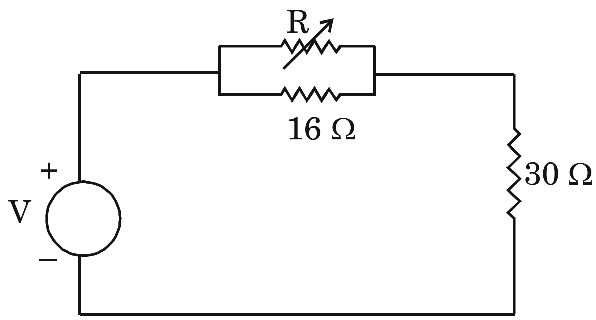
(3) Very close to the valence band

(4) Close to the valence band

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(4)	(3)	(2)	(1)
(B)	(2)	(1)	(4)	(3)
(C)	(4)	(1)	(2)	(3)
(D)	(2)	(3)	(4)	(1)

71. In the circuit shown in the figure, the power dissipated in 30 Ω resistor will be maximum, if the value of R is :



(A) 30 Ω

(B) 16 Ω

(C) 9 Ω

(D) Zero

72. A network has 10 nodes and 17 branches. The number of different node pair voltages would be :

(A) 7

(B) 17

(C) 45

(D) 50

73. Consider the following energy storage capability of basic passive elements is due to the fact that :

(1) Resistance dissipitates energy

(2) Capacitor stores energy

(3) Inductor dissipates energy

Which of the above is/are *correct* ?

(A) (1), (2) and (3)

(B) (1) and (2)

(C) (3) alone

(D) (1) and (3)

74. FIR filters are :

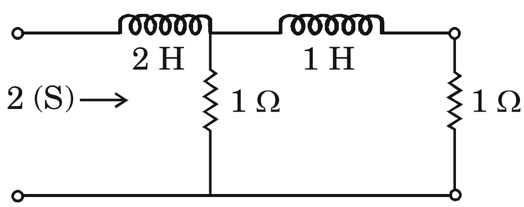
(A) Recursive where present output depends on present and past inputs and output samples only

(B) Non-recursive where present output depends on present and past input samples only

(C) Recursive where present output depends on present and past input samples only

(D) Non-recursive where present output depends on present and past inputs and output samples only

75. Consider the following network, impedance of this network as a function of the complex frequency 'S' consists of a certain number of zeros and poles. What is the location of poles ?



(A) – 2

(B) – 2, ∞

(C) 2

(D) 2, ∞

76. Differentiation of unit impulse function results .... function.

(A) Unit ramp

(B) Unit step

(C) Unit impulse

(D) Unit doublet

77. Which of the following is/are correct for z-transform ?

(1) Analysis of continuous time LTI system cannot be done using z-transform

(2) z-transform exists for signals for which discrete time Fourier transform does not exist

(3) z-transform exists for signals for which discrete time Fourier transform exists

(4) Analysis of continuous time LTI system can be done using z-transform

(A) (2) and (4)

(B) (1) and (2)

(C) (3) and (4)

(D) (2) only

78. Fourier transform of Rectangular function is .... function.

(A) Sinusoidal

(B) Cos

(C) Sin C

(D) Impulse

79. Identify the matrix form for the equation $Ri_L + L\dfrac{di_L}{dt} + V_c = 0$ using state variable concept.

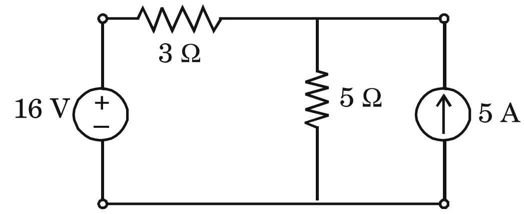
(A) $\begin{bmatrix} \dfrac{di_L}{dt} \\ \dfrac{dV_c}{dt} \end{bmatrix} = \begin{bmatrix} -\dfrac{R}{L} & -\dfrac{1}{L} \\ \dfrac{1}{C} & 0 \end{bmatrix} \begin{bmatrix} i_L \\ V_c \end{bmatrix}$

(B) $\begin{bmatrix} \dfrac{dV_c}{dt} \\ \dfrac{di_L}{dt} \end{bmatrix} = \begin{bmatrix} -\dfrac{R}{L} & -\dfrac{1}{L} \\ \dfrac{1}{C} & 0 \end{bmatrix} \begin{bmatrix} V_c \\ i_L \end{bmatrix}$

(C) $\begin{bmatrix} i_L \\ V_c \end{bmatrix} = \begin{bmatrix} \dfrac{1}{C} & 0 \\ -\dfrac{R}{L} & -\dfrac{1}{L} \end{bmatrix} \begin{bmatrix} \dfrac{di_L}{dt} \\ \dfrac{dV_c}{dt} \end{bmatrix}$

(D) $\begin{bmatrix} \dfrac{di_L}{dt} \\ \dfrac{dV_c}{dt} \end{bmatrix} = \begin{bmatrix} \dfrac{1}{C} & 0 \\ -\dfrac{R}{L} & -\dfrac{1}{L} \end{bmatrix} \begin{bmatrix} i_L \\ V_c \end{bmatrix}$

80. Using superposition theorem, find the current through the 5 Ω resistor in the network shown below :



(A) 3.875 A

(B) 2.53 A

(C) 2.00 A

(D) 1.80 A

81. For effective working as an amplifier Base-emitter and Base-collector junctions of a BJT should be biased as :

(A) Forward and forward respectively

(B) Reverse and forward respectively

(C) Reverse and reverse respectively

(D) Forward and reverse respectively

82. The adjustment terminal of LM 317 three terminal variable voltage regulator is bypassed with a capacitor to obtain :
   (A) Low ripple rejection ratio
   (B) Very high ripple rejection ratio
   (C) Rejection of transients
   (D) High impedance

83. For a dc multistage amplifier the output state should have .... coupling.
   (A) Direct
   (B) RC
   (C) Transformer
   (D) Capacitive

84. A PLL IC 565 uses R and C to be 15 kΩ and 0.02 μF respectively. The free running frequency (f_0) of the V_{co} will be :
   (A) 433.33 kHz
   (B) 1000 Hz
   (C) 833.33 kHz
   (D) 2500 Hz

85. Which of the following does not belong to category of LC tuned oscillator ?
   (A) Colpitt's oscillator
   (B) Hartley oscillator
   (C) Clapp oscillator
   (D) Wein bridge oscillator

86. An op-amp based comparator with positive feedback is called :
   (A) Astable multivibrator
   (B) Schmitt trigger
   (C) Pulse generator
   (D) Integrator

87. The roll-off of a first order low pass filter is :
   (A) +20 dB/decade
   (B) –20 dB/decade
   (C) +40 dB/decade
   (D) –40 dB/decade

88. Identify the *correct* sequence of the following with increasing value of gain :

(*i*) Amplifier without feedback

(*ii*) Amplifier with positive feedback

(*iii*) Oscillator

(*iv*) Amplifier with negative feedback

Codes :

(A) (*iv*), (*iii*), (*ii*), (*i*)

(B) (*i*), (*iii*), (*ii*), (*iv*)

(C) (*iv*), (*i*), (*ii*), (*iii*)

(D) (*i*), (*ii*), (*iii*), (*iv*)

89. Match List-I with List-II and select the *correct* answer from the codes given below :

List I

(*a*) Wein bridge oscillator

(*b*) Voltage shunt feedback amplifier

(*c*) Crystal oscillator

(*d*) Current shunt feedback amplifier

List II

(*i*) RF range

(*ii*) AF range

(*iii*) Low output impedance

(*iv*) High output impedance

(*v*) Low input impedance

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iii*)	(*i*)	(*ii*)	(*v*)
(B)	(*ii*)	(*iii*)	(*i*)	(*v*)
(C)	(*v*)	(*ii*)	(*i*)	(*iii*)
(D)	(*iv*)	(*iii*)	(*v*)	(*i*)

90. **Assertion (A) :**

An operational amplifier should have a low input offset current.

Reason (R) :

Input impedance of operational amplifier is very high.

(A) Both (A) and (R) are true and (R) is correct explanation of (A)

(B) Both (A) and (R) are true but (R) is not correct explanation of (A)

(C) (A) is true and (R) is false

(D) (A) is false and (R) is true

91. Multiplexer facilitates the following conversion :

(A) Single input to one of the multiple outputs

(B) Multiple inputs to single output

(C) Decimal to hexadecimal

(D) Odd parity to even parity

92. The minimum memory size to implement a BCD to seven segment decoder will be :

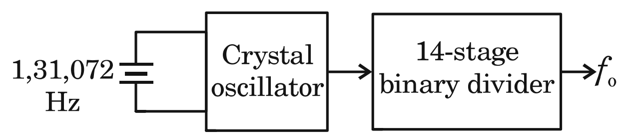
(A) 16 bytes

(B) 10 bytes

(C) 1 k bytes

(D) 8 bytes

93. Output frequency in the following diagram will be :



(A) 1 kHz

(B) 100 Hz

(C) 13 Hz

(D) 8 Hz

94. A DFF is said to be transparent when :

(A) The output is LOW

(B) The output is HIGH

(C) The output follows the clock

(D) The output follows the input

95. Reliable clock distribution is key to synchronous operation of high speed digital circuits. The device used for clock synchronisation in FPGA is :

(A) DLL

(B) CLB

(C) IOB

(D) JTAG

96. Which one of the following is not a PLD ?

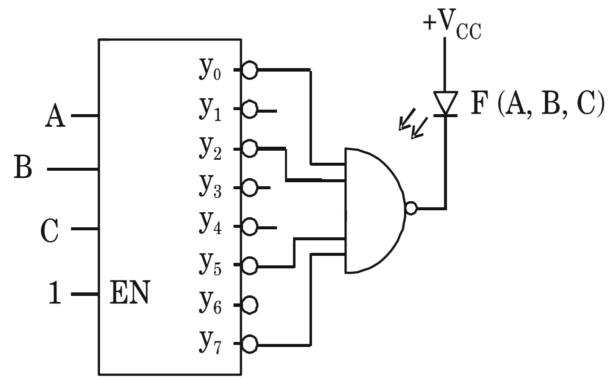
(A) PLA

(B) CPLD

(C) SPROM

(D) CLA

97. For 3 : 8 decoder, the LED will be switched on for :



(A) $C\,B\,A + \bar{C}\,B\,A + C\,\bar{B}\,\bar{A} + C\,B\,\bar{A}$

(B) $\bar{C}\,B\,\bar{A} + \bar{C}\,B\,A + C\,B\,\bar{A} + \bar{C}\,\bar{B}\,\bar{A}$

(C) $\bar{C}\,\bar{B}\,A + \bar{C}\,B\,A + C\,\bar{B}\,\bar{A} + C\,B\,\bar{A}$

(D) $\bar{C}\,\bar{B}\,A + C\,B\,A + C\,\bar{B}\,\bar{A} + C\,B\,\bar{A}$

98. Propagation delay of logic families in descending order can be listed as :

(A) ECL, TTL, CMOS

(B) TTL, ECL, CMOS

(C) CMOS, TTL, ECL

(D) ECL, CMOS, TTL

99. Match the List-I with List-II and select the *correct* answer using the codes given below :

List-I

(*a*) Flash ADC

(*b*) Dual slope ADC

(*c*) Successive Approximation ADC

(*d*) DAC

List-II

(*i*) Music synthesiser

(*ii*) DMM

(*iii*) Digital Camera

(*iv*) Speech digitisation

Codes :

	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iii*)	(*iv*)	(*i*)	(*ii*)
(B)	(*i*)	(*ii*)	(*iii*)	(*iv*)
(C)	(*iii*)	(*ii*)	(*iv*)	(*i*)
(D)	(*ii*)	(*i*)	(*iv*)	(*iii*)

100. **Assertion (A) :**

2's complement arithmetic is preferred in digital computers.

Reason (R) :

The hardware required to obtain 2's complement of a number is simple.

(A) Both (A) and (R) are true and (R) is the correct explanation of (A)

(B) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(C) (A) is true but (R) is false

(D) (A) is false and (R) is true

ROUGH WORK

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