Test Booklet Code & Serial No.
प्रश्नपत्रिका कोड व क्रमांक

B

Paper-III
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)

APR - 38317

Time Allowed : 2½ Hours] **[Maximum Marks : 150**

Number of Pages in this Booklet : **24**

Number of Questions in this Booklet : **75**

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 **75** objective type questions. Each question will carry *two* marks. *All* questions of Paper-III will be compulsory, covering entire syllabus (including all electives, without options).
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.

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 **75** बहुपर्यायी प्रश्न आहेत. प्रत्येक प्रश्नास **दोन** गुण आहेत. या प्रश्नपत्रिकेतील **सर्व** प्रश्न सोडविणे अनिवार्य आहे. सदरचे प्रश्न हे या विषयाच्या संपूर्ण अभ्यासक्रमावर आधारित आहेत.
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 चूकीचा 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 पहिल्यानंतरच 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.

5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत.** इतर ठिकाणी लिहीलेली 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 गैरमार्गाचा अवलंब केल्यास विद्यार्थ्याला परीक्षेस अपात्र ठरविण्यात येईल.
9. परीक्षा संपल्यानंतर विद्यार्थ्याने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापी, 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 III

Time Allowed : 2½ Hours] **[Maximum Marks : 150**

Note : This paper contains **Seventy Five (75)** multiple choice questions. Each question carries **Two (2)** marks. Attempt *All* questions.

1. In a DAC's gain error occurs due to :

   (A) Offset voltages of OP-Amp

   (B) Leakage current in the switches

   (C) Error in feedback resistor value

   (D) Error in current source resistance value

2. A three state controlled buffer has the following states when control is enabled/disabled :

   (A) 1, 0, float

   (B) High, low float

   (C) Both (A) and (B)

   (D) Set, Reset, Halt

3. Match the following and select the *correct* answer using the codes given below :

List I

(*a*) Binary number

(*b*) Hexadecimal number

(*c*) Octal number

(*d*) BCD code

(*e*) EBCDIC code

List II

(*i*) 8-bit code to represent a character

(*ii*) Decimal numbers represented in binary form

(*iii*) A number system with only two states '0' and '1'

(*iv*) A number system with base 8

(*v*) A number system with base 16

Codes :

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

4. Match the following and select the *correct* answer using the codes given below :

Operation Symbol		**Name**
(*a*)	A . B	(*i*) Complement
(*b*)	A $\oplus$ B	(*ii*) AND operation
(*c*)	A + B	(*iii*) Divide operation
(*d*)	A/B	(*iv*) Exclusive-OR operation
(*e*)	A' or B'	(*v*) OR operation

Codes :

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

5. The 8085 microprocessor enters into bus idle machine cycle when :

(A) INTR interrupt is recognised

(B) RST 7.5 is recognised

(C) DAD RP instruction is executed

(D) MOV M, A instruction is executed

6. Maximum number of I/O that can be addressed in I/O mapped mode by INTEL 8085 is :

(A) 65,536

(B) 285

(C) 512

(D) 256

7. What is the size of a 'Special Function Register' memory supported by 8051 microcontroller ?

(A) 64 bytes

(B) 128 bytes

(C) 256 bytes

(D) 1024 bytes

8. MOV A, @ R1 will :

(A) Copy R1 to the accumulator

(B) Copy the accumulator to R1

(C) Copy the contents of memory location whose address is in R1

(D) Copy the accumulator to the contents of memory whose address is in R1

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

List I

(*a*) MVI A, 50 H

(*b*) IN 10H

(*c*) MOV M, A

(*d*) ADD B

List II

(*i*) Direct addressing

(*ii*) Register indirect addressing

(*iii*) Immediate addressing

(*iv*) Register addressing

Codes :

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

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

List I

(*a*) Real physical destination address

(*b*) Offset to program counter address

(*c*) Eleven bit constant address

(*d*) Calling a subroutine within a 2K block of instruction

List II

(*i*) ACALL

(*ii*) SJMP

(*iii*) LJMP

(*iv*) AJMP

Codes :

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

***Instructions* : 11 to 20 :**

Assertion-Reason type questions :

The following items consist of two statements, one labelled as 'Assertion (A)', and the other labelled the 'Reason (R)'. You are to examine these two statements and decide if the Assertion (A) and the Reason (R) are individually true and if so, whether the reason is a correct explanation of the Assertion.

Select your answer to these items using the codes given below and mark your answer sheet accordingly.

Codes :

(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

11. **Assertion (A)** : Creating selective *n* or *p* doped regions is possible due to lithography.

Reason (R) : Lithography directs dopant atoms by electromagnetic deflection.

12. **Assertion (A)** : Admittance is a measure of how easily a circuit will allow a current to flow.

Reason (R) : Admittance, just like impedance, is a complex number, made up of real part *i.e.* conductance and an imaginary part *i.e.* susceptance.

13. **Assertion (A)** : Heat sink is provided to pass transistor in IC voltage regulator.

Reason (R) : Power dissipation increases with decreasing load resistance.

14. **Assertion (A)** : In digital circuits to drive DC relay or lamps usually open collector output drive is preferred.

Reason (R) : Usually relay and lamps are operated on higher DC voltage more than 5 V DC.

15. **Assertion (A)** : A pull-up resistor is desired to be connected in series with LED before it is interfaced to microcontroller port pin.

Reason (R) : This increases the current gain of the port.

16. **Assertion (A)** : In C programming all the operations like arithmetic, relational, equality and logical are carried out before assignment operations.

    Reason (R) : Usually, arithmetic, logical, relational and equality have highest priority of execution in 'C' programming.

17. **Assertion (A)** : S-parameters are applicable to all frequencies.

    Reason (R) : S-parameters are particularly relevant at radio and microwave frequencies.

18. **Assertion (A)** : A continuous time sinusoid is always periodic irrespective of the value of its period.

    Reason (R) : A discrete time sinusoid is not necessarily always periodic.

19. **Assertion (A)** : Phototransistors are mostly used in optical communication.

    Reason (R) : Phototransistors have built in gain.

20. **Assertion (A)** : Wien bridge can be used for measuring frequency.

    Reason (R) : A frequency meter for 50 Hz system has a frequency range of 40 to 60 Hz.

***Instructions* : 21 to 25**

Read the following paragraph and answer question Nos. **21** to **25** :

Absorption in semiconductors at wavelengths around the band edge varies very rapidly with optical frequency. A convenient width for the I region is from 10 to 20 microns and therefore, the silicon photodetectors will be fully efficient in the 0.8 to 0.9 micron wavelength region that coincides exactly with the wavelength range of gallium arsenide (GaAs) laser diodes and LEDs. At shorter wavelengths, the efficiency falls because of absorption in the P contact region, if this is 1 micron thick it will absorb about 15% of the incident radiation at 0.7 micron and at longer wavelengths the light passes through the I region with rapidly decreasing absorption. Clearly, the design of a given diode can be optimized for applications at unusual wavelengths and very long I region PIN diodes have been used for detection at 1.06 micron wavelength. However, the readily obtainable silicon PIN diodes are optimized for use at 800-900 nm

wavelengths, with an I region of the order of 10 microns in width operating at reverse bias voltage of 10-50 volts. These devices are economic, have a very high performance and are simple to use. In systems requiring the use of longer operating wavelengths, either germanium diodes or III-V ternary or quarternary Indium Gallium Arsenide Phosphide (InGaAsP) diodes may be used. The recent devices are currently optimized for use in high speed long haul communications network and general purpose diodes are not readily available. General purpose germanium diodes are easily obtained but are not in frequent use.

21. Response of silicon detector in low wavelength region is poor because :

(A) Band gap not matching with incident radiation

(B) Absorption by bulk region

(C) Large radiative recombination

(D) Reflection from top surface

22. InGaAsP detectors are preferred for detection for the reason :

(A) Fabrication technology is economic

(B) They are III-V compound

(C) Current optimization possible

(D) High quantum efficiency in longer wavelength

23. Silicon detectors are mostly used in visible region as compared InGaAsP because :

(A) Energy gap matching

(B) High reverse bias can be applied for high speed detection

(C) InGaAsP are not reliable

(D) P-i-N structure can only be formed in Si

24. The main reason for adopting P-i-N structure in silicon photodiode is :

(A) i-region allows large reverse bias

(B) to optimise detection for 0.8-0.9 micron

(C) increase depletion region

(D) for better stability

25. At 0.7 µm the absorption of incident radiation decreases in Si detector. This leads to :

(A) decrease of spectral range

(B) increase of spectral range

(C) decrease in quantum efficiency

(D) increase in quantum efficiency

26. A ..... is a compound statement that contains variable declarations.

(A) if then else

(B) if statement

(C) while-do statement

(D) block

27. A ..... is a good way to step through the elements of an array and perform some program action on each indexed variable.

(A) if-then

(B) while-do

(C) for-loop

(D) do-while

28. An array parameter that is modified with a ..... is called constant array parameter.

(A) const

(B) variable

(C) string

(D) integer variable

29. When writing a recursive function definition, always check to see that the function will not produce ..... .

(A) finite recursion

(B) infinite recursion

(C) both (A) and (B)

(D) recursion of any type

30. Match the following and select the correct answer using the codes given below :

'C' Function

(*a*) abs (i)

(*b*) exit (u)

(*c*) fgetc (f)

(*d*) fputs (s, f)

Purpose

(*i*) send string s to the file f

(*ii*) return the absolute value of i

(*iii*) close all files, buffers and program

(*iv*) enter single character from file f

Codes :

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

31. Match the following and select the correct answer using the codes given below :

Math Symbol		**C++ Notation**	
(*a*)	$\neq$	(*i*)	= =
(*b*)	$\leq$	(*ii*)	! =
(*c*)	$\geq$	(*iii*)	> =
(*d*)	=	(*iv*)	< =

Codes :

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

32. A rectangular waveguide has dimension of *a* and *b* respectively, along *x* and *y*-axis. *z*-axis being the direction of propagation. Then the phase shift constant (β) is :

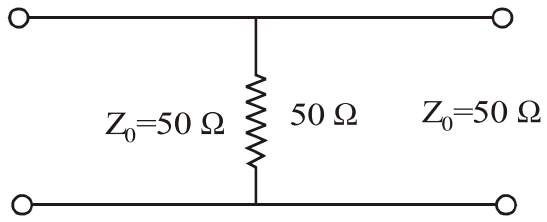
(A) $\sqrt{w^2\mu \in - \left(\frac{m\pi}{a}\right)^2 = \left(\frac{n\pi}{b}\right)^2}$

(B) $w^2\mu \in$

(C) $w^2\mu \in + \left(\frac{m\pi}{a}\right)^2 + \left(\frac{n\pi}{b}\right)^2$

(D) $w^2 / \sqrt{\mu \in}$

33. A load of 50 Ω is connected in shunt in a two-wire transmission line of $Z_0 = 50\ \Omega$ as shown in the figure below. The two port scattering parameter matrix (s-matrix) of the shunt element is :



(A) $\begin{bmatrix} -\frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & -\frac{1}{2} \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} -\frac{1}{3} & \frac{2}{3} \\ \frac{2}{3} & -\frac{1}{3} \end{bmatrix}$

(D) $\begin{bmatrix} \frac{1}{4} & -\frac{3}{4} \\ -\frac{3}{4} & \frac{1}{4} \end{bmatrix}$

34. Which of the following is valid for copper ? (Where, σ, ω and $\in$ are conductivity, angular frequency and permittivity of the material respectively)

(A) $\sigma = 0$

(B) $\sigma < \omega\in$

(C) $\sigma >> \omega\in$

(D) $\sigma = \omega\in$

35. If the transit time of electron is 7×10^{-11} second in Gunn device, then what is the frequency of oscillation ?

(A) 7.3 kHz

(B) 14.3 kHz

(C) 7.3 GHz

(D) 14.3 GHz

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

List I

(*a*) Poynting's vector

(*b*) Standing wave

(*c*) Polarisation

(*d*) Skin depth

List II

(*i*) Combination of incident and reflected wave

(*ii*) Existence of electric and magnetic fields up to certain region

(*iii*) Instantaneous rate of energy flow per unit area

(*iv*) Orientation of electric field with respect to plane of incidence

Codes :

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

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

List I

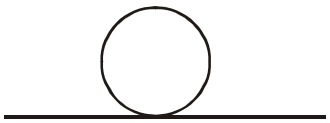
(*a*) Isotropic radiator

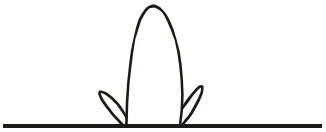
(*b*) Medium directive gain

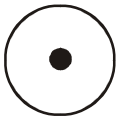
(*c*) Higher directive gain

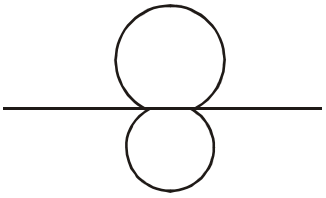
(*d*) Highest directive gain

List II

(*i*) 

(*ii*) 

(*iii*) 

(*iv*) 

Codes :

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

38. A DSBSC signal plus noise is input to a coherent detector. The noise at the detector output is :

(A) Quadrature component

(B) In-phase component

(C) Zero

(D) Signal envelope

39. An FM signal with frequency deviation of 90 kHz and modulating signal bandwidth of 5 kHz is applied to a device characterized by $y(t) = x^2(t)$ where $y(t)$ and $x(t)$ are output and input respectively.

The bandwidth of the output signal is :

(A) 380 kHz

(B) 370 kHz

(C) 190 kHz

(D) 95 kHz

40. A message signal with bandwidth 10 kHz is lower sideband SSB modulated with carrier frequency $f_{c1} = 10^6$ Hz. The resulting signal is then passed through a NBFM (Narrowband frequency modulator) with carrier frequency $f_{c2} = 10^9$ Hz. The bandwidth of the output would be :

(A) 40 kHz

(B) 2 GHz

(C) 2 MHz

(D) 20 GHz

41. A message signal is bandlimited to *fm*. It is frequency translated by multiplying it by a signal Acos $2\pi f_c t$. What should be value of f_c if the bandwidth of the resultant signal is 0.5% of the carrier frequency f_c.

(A) 100 *fm*

(B) 200 *fm*

(C) 300 *fm*

(D) 400 *fm*

42. The Column I lists the attributes and Column II lists the modulation system. Match the attribute to the modulation system that best meets it :

Column I

(*a*) Power efficient transmission of signals

(*b*) Simplest receiver structure

(*c*) Most Bandwidth efficient transmission of voice signal

(*d*) Bandwidth efficient transmission of signals with significant dc component

Column II

(*i*) Conventional AM

(*ii*) FM

(*iii*) USB

(*iv*) SSB-SC

Codes :

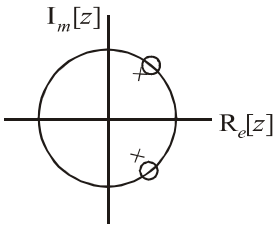
	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iv*)	(*ii*)	(*i*)	(*iii*)
(B)	(*ii*)	(*i*)	(*iv*)	(*iii*)
(C)	(*iii*)	(*i*)	(*ii*)	(*iv*)
(D)	(*ii*)	(*i*)	(*iii*)	(*iv*)

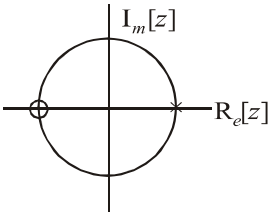
43. Match the table :

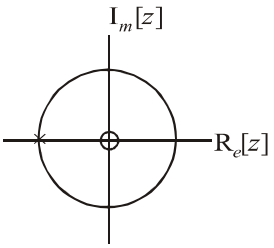
Column I
Digital Filter Type

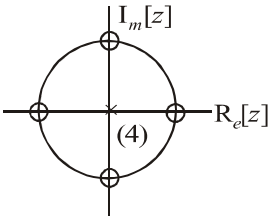
(P) FIR
(Q) Low Pass
(R) Notch
(S) High Pass

Column II
Pole-Zero Diagram

(1) 

(2) 

(3) 

(4) 

(A) (P)–(2), (Q)–(1), (R)–(4), (S)–(3)
(B) (P)–(1), (Q)–(2), (R)–(3), (S)–(4)
(C) (P)–(4), (Q)–(2), (R)–(1), (S)–(3)
(D) (P)–(4), (Q)–(1), (R)–(3), (S)–(2)

44. In a reverse blocking mode of a thyristor :

(A) Junction J_2 is in reverse bias and J_1, J_3 are in forward bias

(B) Junction J_3 is in forward bias and J_1, J_2 are in reverse bias

(C) Junction J_1, J_3 are in reverse bias and J_2 is in forward bias

(D) Junction J_1, J_2 are in forward bias and J_3 is in reverse bias

45. Latching current for an SCR inserted between a dc voltage source of 200 V and a series combination of R = 20 kΩ and L = 0.2 H. If the load current drawn is 100 mA, the minimum pulse width required to turn ON the SCR would be :

(A) 200 µs

(B) 300 µs

(C) 150 µs

(D) 100 µs

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

List I

(*a*) Snubber circuit

(*b*) Voltage clamping circuit

(*c*) Pulse width modulation

(*d*) Thyristor converter

List II

(*i*) Switch mode power supply

(*ii*) Phase angle control

(*iii*) Varistor

(*iv*) Suppression of *dv/dt*

Codes :

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

47. The following does *not* belong to active class of display device :

(A) CRT

(B) OLED

(C) LCD

(D) PDP

48. Point to point optical link has the following design parameter :

(*i*) LED power = 10 mW

(*ii*) Detector sensitivity = 1 nW

(*iii*) Coupling connector loss at source and detector 0.5 dB each

(*iv*) System margin 3dB

(*v*) Link distance 5 km.

What is the loss in optical fiber ?

(A) 0.2 dB/km

(B) 6.2 dB/km

(C) 13.2 dB/km

(D) 26.2 dB/km

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

List I
(Materials)

(*a*) Ge

(*b*) Si

(*c*) GaAs

(*d*) GeO_2

List II
(Properties)

(*i*) Direct band gap

(*ii*) Fiber dopant

(*iii*) High noise detector

(*iv*) Indirect band gap

Codes :

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

50. It is required to measure angular position. Out of the transducers :

(1) Circular potentiometer

(2) LVDT

(3) E pick up

(4) Synchro

The proper devices are :

(A) (1), (2), (3), (4)

(B) (2) and (3)

(C) (1), (2), (4)

(D) (1) and (4)

51. In ac bridge measurements, 'Wagner ground' :

(A) a special RC connection to eliminate stray magnetic effects

(B) a special RC connection to eliminate stray capacitance effects

(C) an unwanted and unintended ground connection

(D) a large metal plate buried in ground connected to one corner of bridge

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

List I

(*a*) Megger

(*b*) Spectrum analyzer

(*c*) Schering bridge

(*d*) Digital counter

List II

(*i*) Measurement of loss angle in a dielectric

(*ii*) Measurement of frequency

(*iii*) Measurement of insulation resistance

(*iv*) Measurement of harmonics

Codes :

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

53. With a derivative feedback control :

(A) A second order system is converted into a first order

(B) A second order system is converted into a third order system

(C) Natural frequency of the oscillation changes

(D) Damping ratio is increased

54. A system has a complex conjugate root pair of multiplicity of two or more roots in its characteristic equation. The impulse response of the system will be :

(A) A sinusoidal oscillation, which decays exponentially, the system is, therefore, stable.

(B) A sinusoidal oscillation with time multiplier the system is, therefore, unstable.

(C) A sinusoidal oscillation, which rises exponentially with time the system is, therefore, unstable.

(D) A DC term and harmonic oscillation, the system, therefore, becomes limiting stable.

55. Match the following and select the correct answer using the codes given below :

List I

(Transfer Function)

(*a*) $\frac{s+1}{s+2}$

(*b*) $\frac{1+0.5s}{1+s}$

(*c*) $\frac{(2s+1)}{(s+1)^2}$

(*d*) $G_c = 5\left(\frac{s+2.39}{s+8.45}\right)\left(\frac{s+0.1}{s+0.03}\right)$

List II

(*i*) Lead-lag compensator

(*ii*) Impulse response

$c(t) = -te^{-t} + 2e^{-t}$ (t > 0)

(*iii*) Lag network

(*iv*) Phase lead compensator

Codes :

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

56. A piece of copper and the other of germanium are cooled from the room temperature to 50 K, then :

(A) resistance of each will increase

(B) resistance of copper will decrease

(C) the resistance of copper will increase while that of germanium will decrease

(D) the resistance of copper will decrease while that of germanium will increase

57. A source follower using a FET usually has a voltage gain :

(A) Greater than 100

(B) Slightly less than unity but positive

(C) Exactly unity but negative

(D) About 10

58. The effective collector to emitter resistance in CE configuration in saturation mode for I_C = 10 mA and V_{CE} = 0.1 V is :

(A) 100 Ω

(B) 50 Ω

(C) 10 Ω

(D) 1 Ω

59. Czokralskii technique is used for :

(A) producing thin slices of silicon

(B) growing amorphous silicon for TFT application

(C) protecting the fabricated IC

(D) growing large single crystal Ingots

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

List I

(*a*) Negative resistance

(*b*) Low resistance

(*c*) Positive resistance

(*d*) High resistance

List II

(*i*) Forward I-V characteristics of PN junction after knee voltage

(*ii*) Reverse I-V characteristics of PN junction before breakdown

(*iii*) Tunnel diode

(*iv*) Zener diode after breakdown

Codes :

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

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

List I

(*a*) Gate oxide of MOSFET

(*b*) Source drain formation of MOSFET

(*c*) Gate conductor of MOSFET

(*d*) Interconnects in IC

List II

(*i*) Diffusion

(*ii*) Dry oxidation

(*iii*) Metallization

(*iv*) Polysilicon deposition

Codes :

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

62. For a given signal :

$$x(n) = \left(\frac{1}{7}\right)^n u(n-2),$$

the ROC of the z-transform of $x(n)$ is :

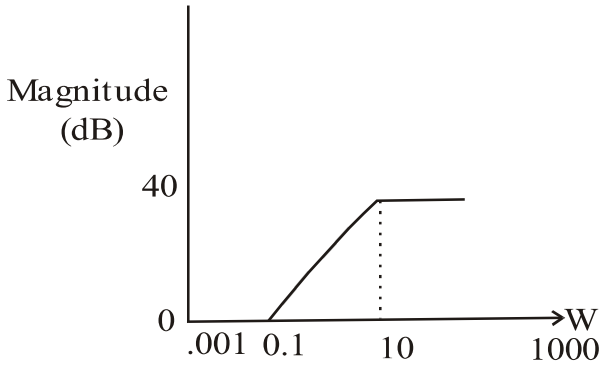
(A) $|z| < \frac{1}{7}$

(B) $|z| < \frac{1}{2}$

(C) $|z| > \frac{1}{7}$

(D) $|z| > \frac{1}{2}$

63. For the asymptotic Bode magnitude plot shown in the following figure, the system transfer function can be :



(A) $(10s + 1)/0.1s + 1$

(B) $(100s + 1)/(0.1s + 1)$

(C) $100s/10s + 1$

(D) $(0.1s + 1)/10s + 1$

64. In a Bode plot –6dB/octave corresponds :

(A) –20 dB/decade

(B) –12 dB/decade

(C) –3 dB/decade

(D) –1 dB/decade

65. The first and the last critical frequency of an RC driving point impedance function must respectively be :

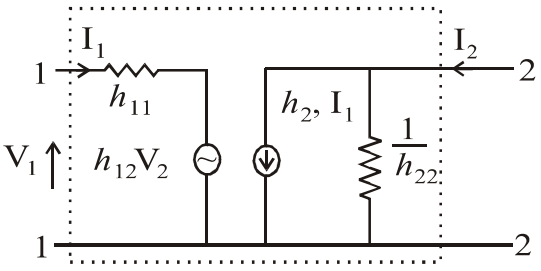
(A) a zero and a pole

(B) a zero and a zero

(C) a pole and a pole

(D) a pole and a zero

66. For the following network, match List I with List II and select the *correct* answer using the codes given below :



List I

(*a*) Short circuit input impedance

(*b*) Open circuit reverse transfer voltage ratio (I_1 = constant)

(*c*) Short circuit forward transfer current ratio

(*d*) Open circuit output admittance

List II

(*i*) $h_{22} = \left.\frac{\partial I_2}{\partial V_2}\right|$ I_1 = constant

(*ii*) $h_{21} = \left.\frac{\partial I_1}{\partial I_1}\right|$ V_2 = constant

(*iii*) $h_{12} = \left.\frac{\partial V_1}{\partial I_1}\right|$ I_1 = constant

(*iv*) $h_{11} = \left.\frac{\partial V_1}{\partial I_1}\right|$ V_2 = constant

Codes :

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

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

List I

(*a*) Square wave applied to LC circuit

(*b*) Step wave applied to capacitor

(*c*) Step wave applied to RC circuit

(*d*) Square wave applied to ideal rectifier

List II

(*i*) Square wave

(*ii*) Bipolar trigger pulses

(*iii*) Impulse

(*iv*) Gradual rise of voltage and reach steady state

Codes :

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

68. In small signal CE amplifier emitter capacitance is provided for :

(A) Obtaining large AC gain

(B) Increasing AC impedance

(C) Bootstraping

(D) Better stability

69. Which of the following transistors is used for switching application ?

(A) BC 147

(B) SL 100

(C) 2N 3055

(D) 2N 2222

70. Typical open loop gain of a IC 741C is of the order :

(A) 3500

(B) 56,000

(C) 2,00,000

(D) 24,00,000

71. Usually NPN transistor as used in OP-amp fabrication. The reason behind is :

(A) NPN transistor have high β

(B) PNP transistor have higher leakage

(C) Class B output stage cannot be formed with PNP

(D) Better technology support for NPN

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

List I

(*a*) LM 339

(*b*) LF 356

(*c*) OP 07

(*d*) LM 311

List II

(*i*) Comparator

(*ii*) Low noise op-amp

(*iii*) Quad comparator

(*iv*) FET input op-amp

Codes :

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

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

List I

(*a*) Voltage divider bias

(*b*) Base bias

(*c*) Emitter bias

(*d*) Collector feedback bias

List II

(*i*) $I_C = (V_{CC} - V_{BE})/(R_C + R_B/\beta_{DC})$

(*ii*) $I_C = (V_{EE} - V_{BE})/(R_e + R_B/\beta_{DC})$

(*iii*) $I_C = (V_{TH} - V_{BE})/(R_E + R_{TH}/\beta_{DC})$

(*iv*) $I_C = \beta_{DC}\ (V_{CC} - V_{BE})/R_B$

$V_{TH} = R_{TH}\ V_{CC}$

$R_{TH} = R_2/(R_1 + R_2)$

Codes :

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

74. Which of the following is/are programmable device(s) in a digital system ?

(*a*) Decoder

(*b*) Multiplexer

(*c*) PAL, GAL, CPLD

(*d*) EPROM, E^2PROM, RAM

(A) (*a*)

(B) (*b*)

(C) (*c*) and (*d*)

(D) (*d*)

75. Stack is also known as :

(A) FIFO memory

(B) Flash memory

(C) LIFO memory

(D) LILO memory

ROUGH WORK