

Test Booklet Code & Serial No.

प्रश्नपत्रिका कोड व क्रमांक
Paper-III

B

ELECTRONIC SCIENCE

Signature and Name of Invigilator

Seat No.

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1. (Signature)

(In figures as in Admit Card)

(Name)

Seat No.

(In words)

2. (Signature)

(Name)

OMR Sheet No.

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(To be filled by the Candidate)

JAN - 38318

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

- Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.
- 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).
- 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 :
 - 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.
 - 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.**
 - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- 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)	(C)	(D)
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- 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.
- Read instructions given inside carefully.
- Rough Work is to be done at the end of this booklet.
- 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.
- 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.
- Use only Blue/Black Ball point pen.**
- Use of any calculator or log table, etc., is prohibited.**
- There is no negative marking for incorrect answers.**

विद्यार्थ्यांसाठी महत्त्वाच्या सूचना

- परिक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोपऱ्यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
- 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.
- परीक्षा सुरु झाल्यावर विद्यार्थ्यांला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनीटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून घ्याव्यात.
 - प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
 - पहिल्या पृष्ठावर नमूद केल्याप्रमाणे प्रश्नपत्रिकेची एकूण पृष्ठे तसेच प्रश्नपत्रिकेतील एकूण प्रश्नांची संख्या पडताळून घ्यावी. 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.
 - वरीलप्रमाणे सर्व पडताळून पहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
- 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)	(C)	(D)
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- या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत. इतर ठिकाणी लिहिलेली उत्तरे तपासली जाणार नाहीत.
- आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
- प्रश्नपत्रिकेच्या शेवटी जोडलेल्या कोऱ्या पानावरच कच्चे काम करावे.
- जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणा व्यतिरिक्त इतर कोठेही नाव, आसन क्रमांक, फोन नंबर किंवा ओळख पटेल अशी कोणतीही खूप केलेली आढळून आल्यास अथवा असभ्य भाषेचा वापर किंवा इतर गैरमागाचा अवलंब केल्यास विद्यार्थ्यांला परीक्षेस अपात्र ठरविण्यात येईल.
- परीक्षा संपल्यानंतर विद्यार्थ्यांने मूळ ओ.एम.आर. उत्तरपत्रिका पर्यवेक्षकांकडे परत करणे आवश्यक आहे. तथापी, प्रश्नपत्रिका व ओ.एम.आर. उत्तरपत्रिकेची द्वितीय प्रत आपल्याबरोबर नेण्यास विद्यार्थ्यांना परवानगी आहे.
- फक्त निळा किंवा काळा बॉल पेनचाच वापर करावा.**
- कॅलक्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.**
- चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.**

JAN - 38318/III—B

**Electronic Science
Paper III**

Time Allowed : 2½ Hours]

[Maximum Marks : 150

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

1. In a D flip-flop output $Q = \text{Input D}$ when :

- (a) The output is low
- (b) The output is high
- (c) Clock is enabled
- (d) Both reset and set input disabled

- (A) (c)
- (B) (a) and (b)
- (C) (a) and (c)
- (D) (c) and (d)

2. How many entries will be there in the truth table of a 3 input NAND gate ?

- (A) 3
- (B) 6
- (C) 9
- (D) 8

3. Match the pairs and select the *correct* answer from the codes given below :

- (a) GAL
- (b) PAL
- (c) CPLD
- (d) FPGA
- (e) EEPROM
- (i) Complex programmable logic device
- (ii) Field programmable gate array logic
- (iii) Programmable array logic
- (iv) Gate array logic devices (generic)
- (v) Electrical erasable programmable read only memory.

Codes :

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

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

List I

- (a) Sequential logic circuits
- (b) Combination logic circuits
- (c) Synchronous sequential logic
- (d) Asynchronous logic circuits

List II

- (i) Independent of clock signal
- (ii) Depends on clock signal
- (iii) Combinational circuit with storage element as feedback path
- (iv) Decoder, multiplexers

Codes :

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

5. Which of the following 8051 instruction perform the move accumulator to external RAM of 16-bit address ?

- (A) MOV @ D PTR, A
- (B) MOV X @ Ri, A
- (C) MOV A, @ Ri
- (D) MOV X @ DPTR, A

6. In 8085 microprocessor, RST 6 instruction transfers program execution to the following location :

- (A) 0024 H
- (B) 0030 H
- (C) 0048 H
- (D) 0060 H

7. SIM instruction in 8085 stands for :

- (A) select interrupt mask
- (B) sort interrupt mask
- (C) set interrupt mask
- (D) subscribe interrupt module

8. The register which acts as 'receive' and 'transmit' buffer in serial communication in 8051 is :

- (A) SCON
- (B) PCON
- (C) SBUF
- (D) Accumulator

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

List I

- (a) S1 = 0, S0 = 0
- (b) S1 = 0, S0 = 1
- (c) S1 = 1, S0 = 0
- (d) S1 = 1, S0 = 1

List II

- (i) OPCODE FETCH
- (ii) READ
- (iii) HALT
- (iv) WRITE

Codes :

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

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

List I

- (a) Port 0 (SFR 80 H)
- (b) Port 1 (SFR 90 H)
- (c) Port 2 (SFR A0 H)
- (d) Port 3 (SFR B0 H)

List II

- (i) Quasi Bi-directional general purpose
- (ii) Content of DPL
- (iii) Serial data communication/ interrupts
- (iv) External memory HIGH byte

Codes :

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

Instructions (Q. Nos. 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) :**
Tunnel diode is used as a memory element.
Reason (R) :
It has negative resistance characteristics due to quantum mechanical effect.
- 12. **Assertion (A) :**
Superposition theorem is not applicable for power calculations.
Reason (R) :
Power is a non-linear quantity.
- 13. **Assertion (A) :**
Op-amp has high input impedance.
Reason (R) :
Op-amps have low input offset current.
- 14. **Assertion (A) :**
In order to synchronise a Mealy type circuits the inputs of the sequential circuit must be synchronized with the clock and the outputs must be sampled only during the clock edge.
Reason (R) :
In Mealy model the outputs may change if input changes during the clock period and output may have momentary false values.

15. **Assertion (A) :**

PWM signal can be easily generated by 8051.

Reason (R) :

It has built in timer/count.

16. **Assertion (A) :**

The result of a logical and operations in C will be true only if both operands are true.

Reason (R) :

The result of a logical or operations will be true if either operand is true or if both operands are true.

17. **Assertion (A) :**

A stub is shorted or open section of transmission line used inconjunction with transmission line.

Reason (R) :

A stub cancel out reflections and provide impedance match.

18. **Assertion (A) :**

From SNR point of view, FM is superior to PM by a factor of 3.

Reason (R) :

Narrowband FM offers no improvement in SNR over AM.

19. **Assertion (A) :**

Graded index optical fibers are used for reasonably high band width application.

Reason (R) :

Graded index fibers are designed to have low time dispersion.

20. **Assertion (A) :**

A hot wire ammeter has a cramped scale.

Reason (R) :

The heat is proportional to square of current.

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

An oscillator having initially been set at a particular frequency will generally drift and wander about in frequency. The frequency stability of an oscillator is a measure of its ability to maintain as nearly a fixed frequency as possible over as long a time as possible. These deviations of frequency arise because the values of critical features, on which the oscillator frequency depends, do

not remain constant in time. The critical features include circuit components, transistor parameters, supply voltage, stray capacitances etc. Accordingly, an obvious but clearly useless solution of the problem of making a frequency stable oscillator is to keep all these features constant. In the first place, the number of circuit features is very large and some of the features like transistor parameters are inherently unstable and extremely difficult to keep constant. Moreover, it is hard to know where stray circuit elements and couplings are located and how to estimate their magnitudes. Thus making it difficult to maintain them constant.

However, it is recognized that in every oscillator circuit there are relatively few circuit features on which the frequency is sensitively

dependent, whereas the frequency dependence on the far larger number of features is comparatively slight. For example the frequency of phase shift oscillator primarily depends on R and C and other parameters do not affect it too much. In a parallel resonant circuit the impedance changes from an inductive to a capacitive reactance as the frequency is increased through resonance point. If the Q is infinite this change in phase is abrupt. Hence a tuned circuit oscillator will have excellent frequency stability independent of temperature, current etc.

21. The frequency of any oscillator is :
- (A) Unstable
 - (B) Constant
 - (C) Not dependent on component selection
 - (D) Decided by semiconductor device only

22. Which among the following is a *false* statement ?
- (A) An oscillator would not produce constant frequency
 - (B) The tuned circuit oscillator is highly unstable
 - (C) Transistor parameters are inherently unstable
 - (D) Stray circuit elements and couplings affect stability of oscillator
23. An effective solution to maintain oscillation frequency highly stable is :
- (A) Switch off the circuit
 - (B) To identify the stray components and bypass them
 - (C) Choose a circuit configuration which does not have large number of critical features
 - (D) Make the circuit impedance high
24. The frequency of a phase shift oscillator :
- (A) depends heavily on parasitic components
 - (B) is decided basically by amplifier gain
 - (C) depends primarily on R and C only
 - (D) is independent of temperature, current etc.
25. The tuned oscillator has excellent frequency stability because :
- (A) the frequency is basically decided by R and C
 - (B) the change in phase is abrupt due to high Q
 - (C) supply voltage is highly stable
 - (D) stray capacitances are of large value
26. A stream of type can be connected to a file with a call to the member function open.
- (A) ifstream
 - (B) ofstream
 - (C) both (A) & (B)
 - (D) object

27. A do-while loop always executes its loop body at least
- (A) twice
 - (B) three times
 - (C) once
 - (D) four times
28. All subtasks in a program can be implemented as functions, either as functions that return a value or as
- (A) Return-function
 - (B) Void-functions
 - (C) Call functions
 - (D) All of the above
29. A is a program that does nothing but test a function.
- (A) Hello program
 - (B) Print program
 - (C) Interrupt program
 - (D) Driver program

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

List I

'C' Function

- (a) a cos (d)
- (b) abs (i)
- (c) fprintf (f,)
- (d) time (p)

List II

Include File

- (i) time.h
- (ii) stdio.h
- (iii) math.h
- (iv) stdlib.h

Codes :

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

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

List I

Expression in 'C'

- (a) $dx + x$
- (b) $((\text{int}) dx) + ix$
- (c) $i + c$
- (d) $x + c$

List II

Data type

- (i) long integer
- (ii) double - precision
- (iii) float or double float
- (iv) integer

Codes :

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

32. For a given rectangular wave guide, the cut-off frequency for TE_{10} mode is always :
- (A) Lower than that for the TE_{11} mode
 - (B) Higher than that for the TE_{11} mode
 - (C) Equal to that for the TE_{11} mode
 - (D) Zero

33. A train of pulses with each pulse $30 \mu\text{s}$ wide and having an inter-pulse separation of $20 \mu\text{s}$ is propagating through a transmission line. How long should the transmission line be in meters so that exactly three pulses are on the line at a time ? Assume propagation speed to be 3×10^8 m/s.

- (A) 2.5 km
- (B) 3.9 km
- (C) 25 km
- (D) 39 km

34. The Maxwell's equation

$$\nabla \times \bar{H} = \left(\bar{J}_{\text{cond}} + \frac{\partial \bar{D}}{\partial t} \right) \text{ for}$$

free space becomes :

- (A) $\nabla \times \bar{H} = 0$
- (B) $\nabla \times \bar{H} = \bar{J}_{\text{cond}}$
- (C) $\nabla \times \bar{H} = \frac{\partial \bar{D}}{\partial t}$
- (D) $\nabla \times \bar{H} = \text{infinite}$

35. Back bombardment of the cathode occurs in

- (A) Klystron
- (B) Magnetron
- (C) Vacuum tubes
- (D) GaAs FET

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

List I

- (a) Maxwell's equation based on Ampere's law
- (b) Maxwell's second equation based on Faraday's law
- (c) Maxwell's third equation based on Gauss' law
- (d) Maxwell's fourth equation based on non-existence of magnetic monopole

List II

- (i) $\nabla \cdot \bar{B} = 0$
- (ii) $\nabla \times \bar{H} = \left(\bar{J} + \frac{\partial \bar{D}}{\partial t} \right)$
- (iii) $\nabla \cdot \bar{D} = \rho$
- (iv) $\nabla \times \bar{E} = -\frac{\partial \bar{B}}{\partial t}$

Codes :

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

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

List I

- (a) Gunn diode
- (b) GaAs FET
- (c) Conventional transistor
- (d) Pin diode

List II

- (i) exhibit stray capacitances and inductances at higher frequencies
- (ii) has small capacitance when reverse biased
- (iii) transferred electron device
- (iv) used in low noise amplifier

Codes :

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

38. In FM superheterodyne receiver, the beat frequency is :

- (A) 910 kHz
- (B) 455 kHz
- (C) 21.14 MHz
- (D) 10.7 MHz

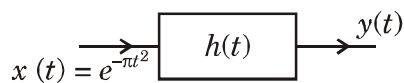
39. Superheterodyne AM receiver has :

- (A) Delayed AGC
- (B) AGC
- (C) No AGC
- (D) Ideal AGC

40. A Hilbert transformer is a :

- (A) Non-linear System
- (B) Non-causal System
- (C) Time-varying System
- (D) Low Pass System

41. Consider the following system :



Impulse response $h(t)$ is a filter matched to $x(t)$. The Fourier transform of the output $y(t)$ shall be :

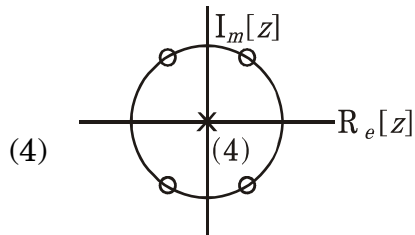
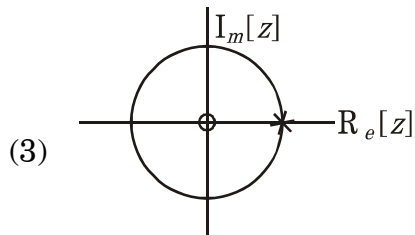
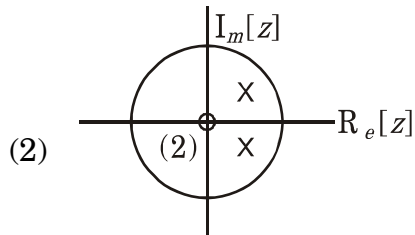
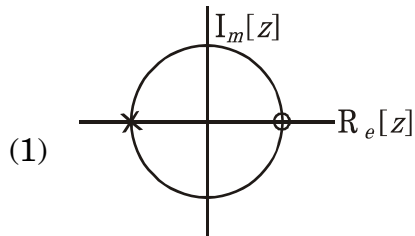
- (A) $e^{-\pi f^2}$
- (B) $e^{-2\pi f^2}$
- (C) $e^{-\pi f^2/2}$
- (D) $e^{-\pi f}$

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

Column I

- (P) Low Pass Filter
- (Q) High Pass Filter
- (R) Band Pass Filter
- (S) FIR Filter

Column II



Codes :

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

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

Column I

- (P) $Km(t) A \sin(\omega_c t)$
 (Q) $A \sin[\omega_c t + Km(t)]$
 (R) $[1 + Km(t)] A \sin(\omega_c t)$
 (S) $A \sin\left[\omega_c t + K \int_{-\infty}^t m(t) dt\right]$

Column II

- (W) PM
 (X) FM
 (Y) AM
 (Z) DSBSC
 (A) P-Z, Q-W, R-Y, S-X
 (B) P-W, Q-Z, R-Y, S-X
 (C) P-X, Q-W, R-Z, S-Y
 (D) P-Y, Q-Z, R-W, S-X

44. Turn off time of an SCR in series with RL circuit can be reduced by :

- (a) increasing circuit resistance R
 (b) decreasing circuit resistance R
 (c) increasing circuit inductance L
 (d) decreasing circuit inductance L

Options :

- (A) b and d
 (B) a and d
 (C) b and c
 (D) d only
45. For an SCR with turn-on time of $5\mu\text{s}$, an ideal trigger pulse should have :
- (A) Short rise time with pulse width = $3\mu\text{s}$
 (B) Long rise time with pulse width = $6\mu\text{s}$
 (C) Short rise time with pulse width = $6\mu\text{s}$
 (D) Long rise time with pulse width = $3\mu\text{s}$

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

List I

- (a) Single phase full bridge inverter
- (b) Power device combining BJT and MOSFET
- (c) Device conducting during OFF period of SCR
- (d) Circuit used for converting low voltage dc to high voltage dc

List II

- (i) step up chopper
- (ii) free wheeling diode
- (iii) IGBT
- (iv) can be operated in Load commutation mode

Codes :

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

47. The following are the components in optical communication :

- (i) Modulator
- (ii) Wavelength Division Multiplexer
- (iii) Repeaters
- (iv) Time Division Multiplexer

The *correct* sequence of their placement from transmission side is :

- (A) (i) (iii) (ii) (iv)
- (B) (ii) (iii) (iv) (i)
- (C) (iv) (ii) (i) (iii)
- (D) (i) (iv) (ii) (iii)

48. The following is the most important requirement for laser :

- (A) Optical pumping
- (B) Stimulated emission
- (C) Positive feedback
- (D) Current modulation

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

List I

(Optical Wavelength)

- (a) 1440 nm
- (b) 850 nm
- (c) 1300 nm
- (d) 1550 nm

List II

- (i) Low loss
- (ii) High speed
- (iii) High loss
- (iv) Low cost

Codes :

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

50. The drawbacks of strain gauges are :

S1 : Low fatigue life

S2 : They are expensive, brittle and sensitive to temperature

S3 : Poor linearity

- (A) S1 and S2
- (B) S2 and S3
- (C) S1 and S3
- (D) S1 only

51. Which of the following are piezoelectric substances ?

- (1) Barium titanate
 - (2) Lead titanate
 - (3) Lead zirconate
 - (4) Cadmium and sulphate
- (A) 1, 2 and 4
 - (B) 1, 3 and 4
 - (C) 1, 2 and 3
 - (D) 2, 3 and 4

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

List I

- (a) Electron microscope
- (b) Oscilloscope
- (c) Galvanometric recorder
- (d) Magnetic recorder

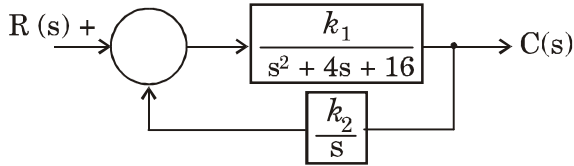
List II

- (i) Electron gun
- (ii) Condensing magnetic lens
- (iii) Recording head
- (iv) Drive motor

Codes :

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

53. The order and type of the system shown in the following figure is :



- (A) Type : 1, Order : 3
 (B) Type : 3, Order : 1
 (C) Type : 2, Order : 2
 (D) Type : 1, Order : 1
54. Consider the following statements regarding root loci.

- (1) All root loci start from the respective poles of $G(s)H(s)$
- (2) All root loci end at the respective zeros of $G(s)H(s)$ or go to infinity.
- (3) The root loci are symmetrical about the imaginary axis of the S-plane.

Of these statements :

- (A) 1, 2 and 3 are correct
 (B) 1 and 2 are correct
 (C) 2 and B are correct
 (D) 1 and 3 are correct

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

List I

(Characteristic Equation of the System)

- (a) $s^5 + s^4 + 2s^3 + 2s^2 + 3s + 15 = 0$
 (b) $s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16 = 0$
 (c) $G(s)H(s) = 10/s (s + 2) (s + 5)$
 (d) $G(s) = \frac{s + 5}{s^2 + 4s + 9}$

List II

(Stability of the System)

- (i) marginally stable
 (ii) unstable
 (iii) stable
 (iv) phase angle of the system varies between 0° and -90° .

Codes :

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

56. If the temperature of a semiconductor diode increases, then leakage current

- (A) remains the same
- (B) decreases
- (C) increases
- (D) becomes zero

57. If the base current is $30 \mu\text{A}$ and current gain is 50, then the collector current will be :

- (A) 15 mA
- (B) 1.5 mA
- (C) 150 mA
- (D) 1.5 A

58. If a full wave rectifier circuit is operating from 50 Hz mains, then the fundamental frequency in the ripple will be :

- (A) 25 Hz
- (B) 50 Hz
- (C) 70.7 Hz
- (D) 100 Hz

59. Thermal oxidation in IC fabrication is a process carried out at :

- (A) High temperature
- (B) Low pressure
- (C) Sub zero temperature
- (D) Room temperature

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

List I

- (a) BJT
- (b) JFET
- (c) ZENER diode
- (d) MOSFET

List II

- (i) High β
- (ii) Voltage regulator
- (iii) Insulated gate voltage controlled current
- (iv) Reverse biased gate

Codes :

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

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

List I

- (a) Ion Implantor
- (b) CVD Reactor
- (c) UV Exposure
- (d) Pad to pin connection

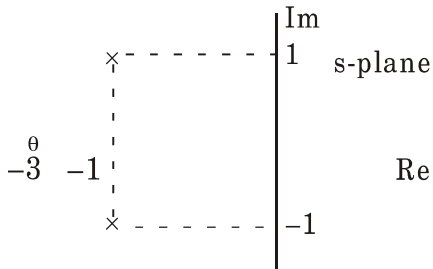
List II

- (i) Photolithography
- (ii) Conductor and dielectric film deposition
- (iii) Bonding
- (iv) Doping

Codes :

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

62. The driving point impedance $Z(s)$ of a network has the pole-zero locations as shown in the following figure. If $Z(0) = 3$, then $Z(s)$ is :



- (A) $3 (s+3) / (s^2+2s+3)$
- (B) $2 (s+3) / (s^2+2s+2)$
- (C) $3 (s-3) / (s^2-2s-2)$
- (D) $2 (s-3) / (s^2-2s-3)$
63. Z-transform of $x(-n)$ is :
- (A) $X(Z)$
- (B) $X(Z^{-2})$
- (C) $X(n)$
- (D) $X(Z^{-1})$

64. The Bode magnitude plot of a certain control system shows the gain to be -20 dB at the phase cross over frequency. What is the gain margin expressed as a ratio ?

- (A) 1
- (B) 5
- (C) 10
- (D) 20
65. Laplace transform of $\delta(t-T)$ is :

- (A) constant
- (B) $1 / e^{-sT}$
- (C) e^{-sT}
- (D) $s e^{-sT}$

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

List I

- (a) h_{fe}
- (b) h_{oe}
- (c) h_{ie}
- (d) h_{re}

List II

- (i) $\left. \frac{\Delta v_{be}}{\Delta v_{ce}} \right|_{I_B = \text{constant}}$
- (ii) $\left. \frac{\Delta v_{be}}{\Delta i_b} \right|_{V_{ce} = \text{constant}}$
- (iii) $\left. \frac{\Delta i_c}{\Delta v_{ce}} \right|_{I_b = \text{constant}}$
- (iv) $\left. \frac{\Delta i_c}{\Delta i_b} \right|_{V_{ce} = \text{constant}}$

Codes :

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

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

List I

- (a) Voltage gain = 10
- (b) Power gain = 10
- (c) Power gain = 1000
- (d) Voltage gain = 100

List II

- (i) 10 dB
- (ii) 40 dB
- (iii) 30 dB
- (iv) 20 dB

Codes :

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

68. Schmitt Trigger is a special configuration of :
- (A) Open loop op-amp
 - (B) Differential input op-amp
 - (C) Positive feedback op-amp
 - (D) Negative feedback op-amp
69. I_D and V_{GS} notations in a FET denote the following parameters :
- (A) Total instantaneous values
 - (B) Instantaneous ac values
 - (C) Phasor values
 - (D) DC values
70. For fabrication of current mirror in an integrated circuit the following components are required :
- (A) Two transistors
 - (B) One transistor and one MOSFET
 - (C) Two transistors in super β mode
 - (D) One transistor and Al reflector
71. Regulated output voltage of a 3-pin fixed voltage regulator can be increased :
- (A) Adding external pass transistor
 - (B) By increasing ground pin voltage
 - (C) Cascading with another 3-pin voltage regulator
 - (D) Using voltage doubler at input
72. Match the List-I with List II and select the *correct* answer using the codes given below :
- List I (Configuration) :**
- (a) Common emitter
 - (b) Common collector
 - (c) Common base
 - (d) Emitter follower
- List II (Characteristics) :**
- (i) High input resistance
 - (ii) Low output resistance
 - (iii) Moderate input resistance
 - (iv) Low input resistance
- Codes :**
- | | | | | |
|-----|-------|-------|-------|-------|
| | (a) | (b) | (c) | (d) |
| (A) | (i) | (iii) | (iv) | (ii) |
| (B) | (i) | (ii) | (iii) | (iv) |
| (C) | (iii) | (ii) | (iv) | (i) |
| (D) | (iv) | (ii) | (i) | (iii) |

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

List I

- (a) Voltage gain
- (b) Current gain
- (c) Power gain
- (d) Output resistance

List II

- (i) Very high CE
- (ii) Very low in CC
- (iii) High in CB
- (iv) Low in CB

Codes :

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

74. In successive approximation ADC offset voltage equal to 1/2 LSB is added to the D/A converter's output. This is done to :

- (A) Improve the speed of operation
- (B) Reduce maximum quantization error
- (C) Increase the number of bits at the output
- (D) Increase the range of input voltage that can be converted

75. The main difference between JK and RS flip-flop is that :

- (a) JK flip-flop requires clock input
 - (b) There is a feedback in JK flip-flop
 - (c) JK flip-flop accepts both inputs as high
 - (d) JK flip-flop is similar to D-flip flop
- (A) *a* and *b*
 - (B) *b* only
 - (C) *a* and *c*
 - (D) *b* and *d*

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ROUGH WORK