Test Booklet No.
प्रश्नपत्रिका क्र.

M

Paper-III
ELECTRONIC SCIENCE

Signature and Name of Invigilator

1. (Signature) ....

   (Name) ....

2. (Signature) ....

   (Name) ....

AUG - 38315

Time Allowed : 2½ Hours]

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

Seat No. [ ][ ][ ][ ][ ]

(In figures as in Admit Card)

Seat No. ....

(In words)

OMR Sheet No. [ ][ ][ ][ ][ ][ ]

(To be filled by the Candidate)

[Maximum Marks : 150

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

Instructions for the Candidates	विद्यार्थ्यांसाठी महत्त्वाच्या सूचना
1. Write your Seat No. and OMR Sheet No. in the space provided on the top of this page.	1. परीक्षार्थींनी आपला आसन क्रमांक या पृष्ठावरील वरच्या कोप-यात लिहावा. तसेच आपणांस दिलेल्या उत्तरपत्रिकेचा क्रमांक त्याखाली लिहावा.
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).	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. 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 :	3. परीक्षा सुरु झाल्यावर विद्यार्थ्याला प्रश्नपत्रिका दिली जाईल. सुरुवातीच्या 5 मिनिटांमध्ये आपण सदर प्रश्नपत्रिका उघडून खालील बाबी अवश्य तपासून पहाव्यात.
(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.	(i) प्रश्नपत्रिका उघडण्यासाठी प्रश्नपत्रिकेवर लावलेले सील उघडावे. सील नसलेली किंवा सील उघडलेली प्रश्नपत्रिका स्विकारू नये.
(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.**	(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) After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.	(iii) वरीलप्रमाणे सर्व पडताळून पहिल्यानंतरच प्रश्नपत्रिकेवर ओ.एम.आर. उत्तरपत्रिकेचा नंबर लिहावा.
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)	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. 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.	5. या प्रश्नपत्रिकेतील प्रश्नांची उत्तरे **ओ.एम.आर. उत्तरपत्रिकेतच दर्शवावीत.** इतर ठिकाणी लिहीलेली उत्तरे तपासली जाणार नाहीत.
6. Read instructions given inside carefully.	6. आत दिलेल्या सूचना काळजीपूर्वक वाचाव्यात.
7. Rough Work is to be done at the end of this booklet.	7. प्रश्नपत्रिकेच्या शेवटी जोडलेल्या को-या पानावरच कच्चे काम करावे.
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.	8. जर आपण ओ.एम.आर. वर नमूद केलेल्या ठिकाणा व्यतिरिक्त 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. 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.	9. परीक्षा संपल्यानंतर विद्यार्थिने 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. **Use only Blue/Black Ball point pen.**	10. **फक्त निळ्या किंवा काळ्या बॉल पेनचाच वापर करावा.**
11. **Use of any calculator or log table, etc., is prohibited.**	11. कॅल्क्युलेटर किंवा लॉग टेबल वापरण्यास परवानगी नाही.
12. **There is no negative marking for incorrect answers.**	12. चुकीच्या उत्तरासाठी गुण कपात केली जाणार नाही.

Eelectronic 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. The current in a PMOS transistor is :

   (A) Less than thrice that in NMOS device

   (B) Greater than thrice that in a PMOS device

   (C) Less than half that in an NMOS device

   (D) Greater than half that of in WMOS device

2. A voltage regulator is based on the principle of :

   (A) Zener breakdown

   (B) Avalanche breakdown

   (C) Amplification

   (D) Rectification

3. Match the following lists and choose the *correct* answer from the codes given below :

   ### List I
   ### (Device)

   (*a*) SCR

   (*b*) Triac

   (*c*) UJT

   (*d*) Diac

   ### List II
   ### (Characteristic)

   (*i*) Bidirectional device

   (*ii*) Single junction two base resistance device

   (*iii*) Two terminal bidirectional device

   (*iv*) Unidirectional device

   Codes :

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

4. Match the lists and choose the *correct* answer from the codes given below :

List I

(Technique)

(*a*) Diffusion

(*b*) Czchralski

(*c*) Electron lithography

(*d*) Positive resist

List II

(Characteristic)

(*i*) Higher resolution than optical lithography

(*ii*) Lower molecular weight and greater solubility

(*iii*) Crystal growth

(*iv*) Fick's laws

Codes :

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

5. What is the B_{Fmin} of a npn-transistor for a collector current of 20 mA and base current of 400 µA ?

(A) 500

(B) 5

(C) 50

(D) 5000

6. Match the lists and choose the *correct* answer from the codes given below :

List I

(Technique)

(*a*) Zone process

(*b*) Epitaxy

(*c*) Metallization

(*d*) Isolation

List II

(Characteristic)

(*i*) pn-junction

(*ii*) Interconnections

(*iii*) Exactly the same structure

(*iv*) Crystal growth

Codes :

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

7. What is the position of the peak of a 150 keV boron implant into silicon, if range parameter is 4300 Å, σ_p = 800 Å, γ = −1.4 and β = 6. (Use Pearson distribution).

(A) 500 Å

(B) 485 Å

(C) 5000 Å

(D) 4850 Å

8. The Laplace's transform of :

$$f(t) = t \sin at$$

is :

(A) $\dfrac{1}{s}$

(B) $\dfrac{1}{1 + s^2}$

(C) e^{-sa}

(D) $\dfrac{2as}{\left(s^2 + a^2\right)^2}$

9. Scaling property of z-transform is given by the expression :

(A) $a^n X(n) = X(a^n z)$

(B) $a^n X(n) = X(a^{-1} z)$

(C) $a^n X(n) = X(z)/a^n$

(D) $X(an) = aX(z)$

10. Correlate the items from List I and List II and choose the *correct* answer from the codes given below :

List I

(*a*) Thevenin's theorem

(*b*) Norton's theorem

(*c*) Maximum power theorem

(*d*) Passive filters

List II

(*i*) Attenuation

(*ii*) Voltage source

(*iii*) Complex conjugate of source impedance

(*iv*) Current source

Codes :

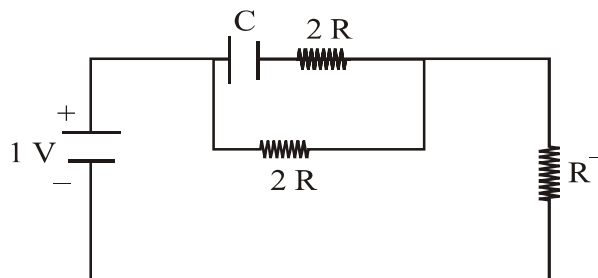|	(*a*)	(*b*)	(*c*)	(*d*)
(A)	(*iii*)	(*i*)	(*iv*)	(*ii*)
(B)	(*ii*)	(*iv*)	(*iii*)	(*i*)
(C)	(*i*)	(*iii*)	(*iv*)	(*ii*)
(D)	(*ii*)	(*iii*)	(*i*)	(*iv*)

11. A circuit fed by two sources of different frequency and magnitudes $100 \angle 0°$ V and $50 \angle 30°$ V. The current in a particular branch is $10 \angle 20°$ A. If the magnitudes of the sources are changed to $200 \angle 0°$ V and $100 \angle 0°$ V. The current in that branch should be :

(A) $20 \angle 20°$ A

(B) $10 \angle 20°$ A

(C) $14.14 \angle 20°$ A

(D) $10 \angle -20°$ A

12. At a certain frequency the output voltage of a filter is 6 V and the input is 12 V. The voltage ratio in decibles is :

(A) -12.04 dB

(B) $+6.02$ dB

(C) -6.02 dB

(D) $+12.04$ dB

13. The time constant of the circuit in the figure is :

(A) RC

(B) 2 RC

(C) 3 RC

(D) 5 RC

14. Match the following and choose the *correct* answer from the codes given below :

List I

(a) LM 317

(b) 7912

(c) 7805

(d) μA 747

List II

(i) Dual OPAMP

(ii) +5V regulator

(iii) −12V regulator

(iv) Variable voltage regulator

Codes :

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

15. Match List I with List II and choose the *correct* answer from the codes given below :

List I

(*a*) Monostable multivibrator

(*b*) Bistable multivibrator

(*c*) Schmitt trigger

(*d*) Astable multivibrator

List II

(*i*) Square wave generator

(*ii*) No stable state

(*iii*) One stable state

(*iv*) Two stable states

Codes :

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

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

List I

(*a*) α of transistor

(*b*) Common Mode Rejection Ratio (CMRR)

(*c*) β of a transistor

(*d*) Lock range

List II

(*i*) PLL

(*ii*) < 1

(*iii*) ∞

(*iv*) > 1

Codes :

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

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

List I

(*a*) Voltage controlled device

(*b*) Current controlled device

(*c*) –ve conductance device

(*d*) Lock range

List II

(*i*) BJT

(*ii*) UJT

(*iii*) FET

(*iv*) PLL

Codes :

    (*a*) (*b*) (*c*) (*d*)

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

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

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

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

18. A UJT has R_{BB} = 10 K and RB_2 = 4 K. Its intrinsic stand-off ratio is :

(A) 0.4

(B) 0.6

(C) 3.5

(D) 2.4

19. When a reverse gate voltage of 12 V is applied to JFET, the gate current is 1 nA. Then the resistance between the gate and source will be :

(A) 12,000 MΩ

(B) 10,000 MΩ

(C) 50,000 mΩ

(D) 12 Ω

20.
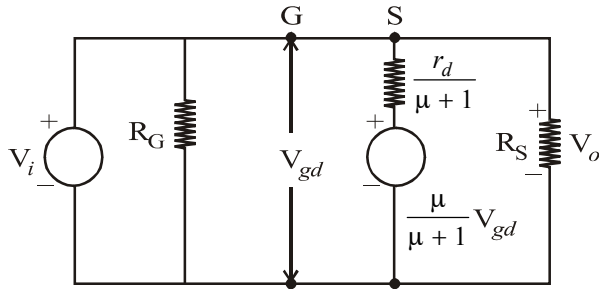
In the Common Drain (CD) amplifier, let $R_S = 4$ kΩ, $R_G = 10$ MΩ, $\mu = 50$ and $r_d = 35$ kΩ. Then the voltage gain A_V will be :

(A) 0.836

(B) 100

(C) 0.700

(D) 0.5

21. Simplification of Boolean expression

$$\overline{A\overline{B} + \overline{ABC}} + A\left(B + A\overline{B}\right) \quad \text{leads}$$

to :

(A) 0

(B) 1

(C) $\overline{A}$

(D) C

22. Consider the following gates :

(i) RTL

(ii) High Speed TTL

(iii) ECL

(iv) CMOS

The *correct* sequence of their decrease in power dissipation is :

(A) (iii) (i) (ii) (iv)

(B) (iii) (i) (iv) (ii)

(C) (i) (iii) (ii) (iv)

(D) (iii) (ii) (iv) (i)

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

List I

(a) R.S. Flip-flop

(b) J.K. Flip-flop

(c) T-Flip-flop

(d) D-Flip-flop

List II

(i) $Q_{n + 1} = Q_n$

(ii) $Q_{n + 1} = \overline{Q}_n$

(iii) 1 bit memory

(iv) race-around

Codes :

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

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

List I

(*a*) 74157

(*b*) 71153

(*c*) 74152

(*d*) 74150

List II

(*i*) Quad 2 : 1 multiplier

(*ii*) Dual 4 : 1 multiplexer

(*iii*) 8 : 1 multiplexer

(*iv*) 16 : 1 multiplexer

Codes :

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

25. The following memory requires least power for storage :

(A) SRAM

(B) DRAM

(C) FLASH

(D) SDRAM

26. Which type of analog-to-digital converter is often used in digital voltmeter ?

(A) Dual slope A/D converter

(B) Single slope A/D converter

(C) Flash converter

(D) Successive approximation method

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

List I

(*a*) Vectored interrupt

(*b*) Programmable timer

(*c*) Highest priority interrupt

(*d*) Register pair used for addressing M register

List II

(*i*) HL

(*ii*) Trap

(*iii*) 8253

(*iv*) RST 7.5

Codes :

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

28. In 8085, the register which holds the address of the next instruction to be executed is :

    (A) Instruction register

    (B) Stack pointer

    (C) Temporary register

    (D) Program counter

29. Microprocessor 8086 allows floating point arithmetic calculation in :

    (A) Maximum mode

    (B) Minimum mode

    (C) Lock mode

    (D) Wait state mode

30. The interrupts in 8085 microprocessor are :

    (*i*) RST 6.5

    (*ii*) RST 5.5

    (*iii*) TRAP

    (*iv*) RST 0

    The sequence from lowest priority to highest priority is :

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

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

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

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

31. Stack pointer is :

    (A) a 16-bit register that indicates the beginning of the stack memory

    (B) a register that decodes and executes 16-bit arithmetic expression

    (C) the first memory location where a subroutine address is stored

    (D) a register in which flag bits are stored

32. How many interrupts does 8051 microcontroller support ?

    (A) Four

    (B) Six

    (C) Five

    (D) Two

33. What is the function performed by IC 8279 when interfaced with microprocessor 8085 ?

    (A) Relay interfacing

    (B) Stepper motor interfacing

    (C) Display interfacing only (LCD/LED)

    (D) Display (7-segment) interfacing and keyboard interfacing

34. What will be the result of executing following C program ?

for (count = 1; x < = 100; ++ count){

Scanf("%f",&x);

if(x < 0) {

printf("Error–Negative Value of x");

continue

}

}

(A) The x values will be read in until it becomes negative when the execution of loop will stop

(B) The loop will continue to execute for negative values of x only

(C) The current value of x will be bypassed if it is negative and execution continues to next pass

(D) The message "Error—Negative Value of x" is printed and execution stops

35. When 273 is the number input to the following program what will be the output ?

include <stdio.h>

int main( )

{int n, r;

scanf("%i", & n);

r = n % 2;

if (r = = 0)

printf("The number is even\n");

else

printf("The number is odd\n");

return 0

}

(A) The number is odd

(B) The number is even

(C) The stdio.h doesn't support printf function

(D) Type of input doesn't match with type definition

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

List I

(*a*) Single character input

(*b*) The function for input from standard input device

(*c*) Statement which allows multiple branching

(*d*) The function call when the argument value doesn't change in calling function

List II

(*i*) Passing by value

(*ii*) Scanf

(*iii*) Getchar

(*iv*) Switch case

Codes :

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

37. Which of the following statements is *incorrect* ?

(A) the int86( ) function requires the addresses of the unions

(B) The int86( ) function requires interrupt number corresponding to the ROM-BIOS function to be involved

(C) In 'int86( )', 'int' stands for 'interrupt' and '86' refers to the 8086 family of microprocessors

(D) The int86( ) function needs only two arguments

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

List I

(*a*) getc

(*b*) getch

(*c*) getche

(*d*) getchar

List II

(*i*) Reads a character from keyboard and echoes it

(*ii*) Reads a character from keyboard (macro version)

(*iii*) Reads a character from a file (macro version)

(*iv*) Reads a character from the keyboard

Codes :

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

39. What will be the output of the program ?

```
# include <stdio.h>
# include <conio.h>
# include <math.h>
void main( )
{
    float d = 28.4567;
    clrscr( );
    printf("%g\n" ceil(d));
    printf("%g\n" floor(d));
    getch( );
}
```

(A) 29
     28

(B) 29.56
     28.56

(C) 28
     29

(D) 29
     27

40. Given equations $\vec{\nabla} \cdot \vec{E} = 0$,

$\vec{\nabla} \cdot \vec{B} = 0$, $\qquad \vec{\nabla} \times \vec{H} = \sigma \vec{E} + \dfrac{\partial \vec{D}}{\partial t}$

and $\qquad \vec{\nabla} \times \vec{E} = -\dfrac{\partial \vec{B}}{\partial t}$ with

$\vec{E} = \hat{y} \, E_y e^{j\omega t}$ and $\vec{H} = \hat{z} \, H_z e^{j\omega t}$

the wave equation has the form :

(A) $\dfrac{\partial^2 E_y}{\partial x^2} = \dfrac{1}{\omega^2 \mu \in - \sigma} \cdot E_y$

(B) $\dfrac{\partial^2 E_y}{\partial x^2} = -\omega^2 E_y$

(C) $\dfrac{\partial^2 E_y}{\partial x^2} = \sigma E_y$

(D) $\dfrac{\partial^2 E_y}{\partial x^2} = \left(j\omega t \mu - \omega^2 \mu \in \right). E_y$

41. Given $Z_n = 0.5 + j\,0.5$. The reflection coefficient ρ_0 is given by :

(A) 1

(B) $-0.2 + 0.4 \, j$

(C) $0.5 - 0.5 \, j$

(D) 0

14

42. Identify the type of modulation the following circuit will give :
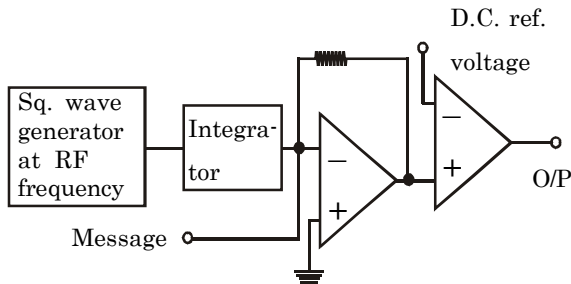
(A) PPM

(B) PWM

(C) PAM

(D) PCM

43. Correct sequence of various blocks in a superhet receiver system is :

(A) antenna—RF amplifier— demodulator—detector

(B) demodulator—antenna—RF amplifier—detector

(C) antenna—RF amplifier— detector—demodulator

(D) RF amplifier—antenna— demodulator—detector

44. The FM transmitter has blocks carrier oscillator-buffer amplifier-frequency multipliers-driver amplifier-power amplifier-antenna, connected sequencially. It has carrier oscillator centre frequency of 3.5 MHz. The oscillator shifts frequency by ± 1.6 kHz when a 3.6 V pp message signal is applied. The frequency multiplier section has three frequency tripplers. The carrier frequency (f_c) and deviation of carrier frequency (Δf_c) at the antenna are :

(A) 94.5 MHz, ± 43.2 kHz

(B) 3.5 MHz, ± 1.6 kHz

(C) 94.5 MHz, ± 1.6 kHz

(D) 3.5 MHz, ± 43.2 kHz

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

   List I

   (*a*) RF amplifier

   (*b*) Loudspeaker

   (*c*) Demodulator

   (*d*) IF amplifier

   List II

   (*i*) Amplifies received carrier and side bands

   (*ii*) gives acoustic output

   (*iii*) has IF input and AF output

   (*iv*) Fixed tuned to IF

   Codes :

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

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

   List I

   (*a*) FM

   (*b*) DM

   (*c*) PSK

   (*d*) PCM

   List II

   (*i*) Slope overload

   (*ii*) Data communication

   (*iii*) Envelope detector

   (*iv*) Capture effect

   (*v*) Hilbert transform

   (*vi*) Matched filter

   Codes :

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

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

List I

(a) D layer

(b) E layer

(c) F layer

(d) Troposphere

List II

(i) 110 km

(ii) 10 km

(iii) 60 km

(iv) 350 km

Codes :

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

48. Capacitance of a dielectric filled capacitor is :
   (i) Directly proportional to dielectric constant of the material
   (ii) Directly proportional to the over-lapping areas of two conducting plates
   (iii) Inversely proportional to the distance between two conducting plates
   (iv) Directly proportional to area of any one of the conducting plates

   The *correct* answers are :
   (A) (i), (ii), (iii)
   (B) (i), (ii), (iii), (iv)
   (C) (i), (iii), (iv)
   (D) (i) and (ii) only

49. A UJT :
   (A) has negative resistance characteristics
   (B) has low noise device
   (C) has bipolar device
   (D) is high power device

50. The dc voltage for a 3-phase half converter (average output) that occurs at delay angle, $\alpha = 0$ is :
   (A) $\dfrac{V_m}{2\pi}$

   (B) $\dfrac{3\sqrt{3}\,V_m}{2\pi}$

   (C) $\dfrac{3\sqrt{3}\cdot V_m}{\pi}$

   (D) $\dfrac{2\,V_m}{\pi}$

51. A separately excited dc motor is stable in :

   (A) regenerative braking

   (B) dynamic braking

   (C) motoring

   (D) plugging

52. Best suited optical fiber for LED light source is :

   (A) Single mode fiber

   (B) Graded index fiber

   (C) High numerical aperture fiber

   (D) Plastic fiber

53. Internal quantum efficiency of a photodiode can be increased by :

   (A) using avalanche process

   (B) using intrinsic region

   (C) doping Ge in silicon PN junction

   (D) configuring PN junction in photovoltaic mode

54. The biggest disadvantage of piezo-electric transducer is :

   (A) low voltage output

   (B) low current output

   (C) complex circuitry is required

   (D) low sensitivity

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

List I

(*a*) White noise

(*b*) Shot noise

(*c*) Dark current noise

(*d*) Surface leakage current noise

List II

(*i*) Avalanche diode

(*ii*) PMT

(*iii*) Resistance

(*iv*) Transistor

Codes :

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

56. In a normal ECG waveform which wave has the maximum amplitude ?

(A) P wave

(B) R wave

(C) Q wave

(D) T wave

57. Consider the following statements regarding negative feedback in a closed loop system :

(1) It increases sensitivity

(2) It minimizes the effect of disturbance

(3) There is a possibility of instability

(4) It improves the transient response

Of these statements :

(A) (1), (3) and (4) are correct

(B) (1), (2) and (4) are correct

(C) (1), (2) and (3) are correct

(D) (2), (3) and (4) are correct

58. Consider the following block diagrams :

(1)

(2)

(3)

(4)
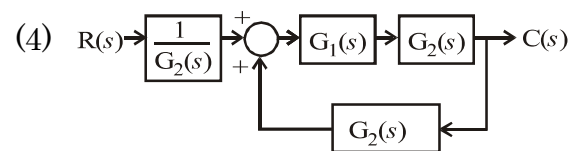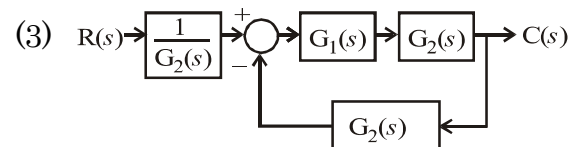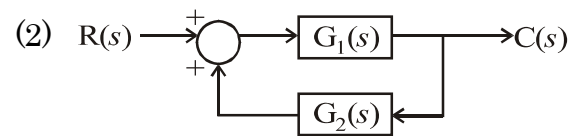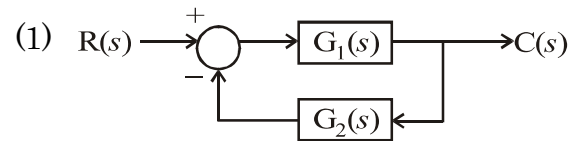
Which of the block diagrams can be reduced to transfer function ?

$$\frac{C(s)}{R(s)} = \frac{G_1(s)}{1 - G_1(s) \cdot G_2(s)}.$$

(A) (1) and (3)

(B) (2) and (4)

(C) (1) and (4)

(D) (2) and (3)

[P.T.O.

64. **Assertion (A) :**

Information is returned to the calling program via the return statement.

Reason (R) :

There are options like passing by value and passing by reference for interfunctional exchange of information.

65. **Assertion (A) :**

In a lossless, reciprocal three port junction all the three ports cannot be matched.

Reason (R) :

For a lossless three port junction s-matrix is unitary.

66. **Assertion (A) :**

Microwave communication is a line of sight communication.

Reason (R) :

Microwaves can penetrate through all atmospheric layers.

67. **Assertion (A) :**

SMPs are light weight compared to conventional power supplies.

Reason (R) :

SMPs use high frequency step down transformer.

68. **Assertion (A) :**

Photomultiplier detector are the best optical detectors.

Reason (R) :

Photomultiplier devices are based on avalanche process of photo-multiplication.

69. **Assertion (A) :**

X-ray diffractometer are used for checking glass formation.

Reason (R) :

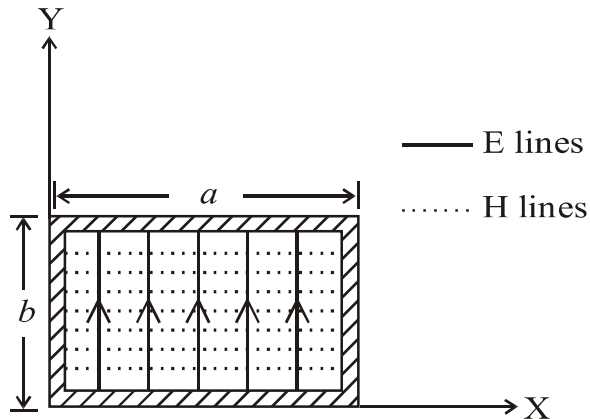X-ray diffractometer uses Bragg principle of diffraction.

70. **Assertion (A) :**

Poles on the right hand side of the s-plane represent instability of the system.

Reason (R) :

As per the Routh-Hurwitz criteria a change of sign of terms in the first column leads to instability.

(Directions for Q. Nos. 71 to 75)
Based on the figure presented answer Q. 71 to Q 75.

71. The dominant mode in this wave guide is ....
    (A) TM_{11}
    (B) TM_{21}
    (C) TE_{11}
    (D) TE_{10}

72. In the mode shown ....
    (A) The direction of electric field is always and everywhere transverse to the direction of propagation
    (B) The direction of electric field is always parallel to the direction of propagation
    (C) The direction of magnetic field is always and everywhere transverse to the direction of propagation
    (D) The direction of electric field is sometimes transverse to the direction of propagation

73. The cut-off wavelength is ....
    (A) $a/2$
    (B) a^2
    (C) $3a$
    (D) $2a$

74. The number of half sine wave variations of electric field on X direction is ....
    (A) Zero
    (B) Three
    (C) One
    (D) Two

75. The wave is propagating in .... direction.
    (A) X
    (B) Y
    (C) Z
    (D) Sometimes in X, sometimes in Y

ROUGH WORK

[P.T.O.

ROUGH WORK