

Signature and Name of Invigilator

- 1. (Signature) _____
(Name) _____
- 2. (Signature) _____
(Name) _____

Answer Sheet No. :
(To be filled by the Candidate)

Roll No.

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(In figures as per admission card)

Roll No. _____
(In words)

Test Booklet No.

D—8806

PAPER—II

Time : 1¼ hours]

ELECTRONIC SCIENCE

[Maximum Marks : 100

Number of Pages in this Booklet : 16

Number of Questions in this Booklet : 50

Instructions for the Candidates

1. Write your roll number in the space provided on the top of this page.
2. This paper consists of fifty multiple-choice type of questions.
3. At the commencement of examination, the question booklet will be given to you. In the first 5 minutes, you are requested to open the booklet and compulsorily examine it as below :
 - (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 and do not accept an 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 pages/questions missing or duplicate or not in serial order or any other discrepancy should be got replaced immediately by a correct booklet from the invigilator within the period of 5 minutes. Afterwards, neither the question booklet will be replaced nor any extra time will be given.
 - (iii) After this verification is over, the Serial No. of the booklet should be entered in the Answer-sheets and the Serial No. of Answer Sheet should be entered on this Booklet.
4. Each item has four alternative responses marked (A), (B), (C) and (D). You have to darken the oval as indicated below on the correct response against each item.
Example :

(A)	(B)	(C)	(D)
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where (C) is the correct response.
5. Your responses to the items are to be indicated in the Answer Sheet given **inside the Paper I booklet only**. If you mark at any place other than in the ovals in the Answer Sheet, it will not be evaluated.
6. Read instructions given inside carefully.
7. Rough Work is to be done in the end of this booklet.
8. If you write your name or put any mark on any part of the test booklet, except for the space allotted for the relevant entries, which may disclose your identity, you will render yourself liable to disqualification.
9. You have to return the test question booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
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.

परीक्षार्थियों के लिए निर्देश

1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
2. इस प्रश्न-पत्र में पचास बहुविकल्पीय प्रश्न हैं।
3. परीक्षा प्रारम्भ होने पर, प्रश्न-पुस्तिका आपको दे दी जायेगी। पहले पाँच मिनट आपको प्रश्न-पुस्तिका खोलने तथा उसकी निम्नलिखित जाँच के लिए दिये जायेंगे जिसकी जाँच आपको अवश्य करनी है :
 - (i) प्रश्न-पुस्तिका खोलने के लिए उसके कवर पेज पर लगी कागज की सील को फाड़ लें। खुली हुई या बिना स्टीकर-सील की पुस्तिका स्वीकार न करें।
 - (ii) कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चेक कर लें कि वे पूरे हैं। दोषपूर्ण पुस्तिका जिनमें पृष्ठ / प्रश्न कम हों या दुबारा आ गये हों या सीरियल में न हों अर्थात् किसी भी प्रकार की त्रुटिपूर्ण पुस्तिका स्वीकार न करें तथा उसी समय उसे लौटाकर उसके स्थान पर दूसरी सही प्रश्न-पुस्तिका ले लें। इसके लिए आपको पाँच मिनट दिये जायेंगे। उसके बाद न तो आपकी प्रश्न-पुस्तिका वापस ली जायेगी और न ही आपको अतिरिक्त समय दिया जायेगा।
 - (iii) इस जाँच के बाद प्रश्न-पुस्तिका की क्रम संख्या उज्जर-पत्रक पर अंकित करें और उज्जर-पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें।
4. प्रत्येक प्रश्न के लिए चार उज्जर विकल्प (A), (B), (C) तथा (D) दिये गये हैं। आपको सही उज्जर के दीर्घवृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है।
उदाहरण :

(A)	(B)	(C)	(D)
-----	-----	-----	-----

जबकि (C) सही उज्जर है।
5. प्रश्नों के उज्जर केवल प्रश्न पत्र I के अन्दर दिये गये उज्जर-पत्रक पर ही अंकित करने हैं। यदि आप उज्जर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उज्जर चिह्नंकित करते हैं, तो उसका मूल्यांकन नहीं होगा।
6. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
7. कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें।
8. यदि आप उज्जर-पुस्तिका पर अपना नाम या ऐसा कोई भी निशान जिससे आपकी पहचान हो सके, किसी भी भाग पर दर्शाते या अंकित करते हैं तो परीक्षा के लिये अयोग्य घोषित कर दिये जायेंगे।
9. आपको परीक्षा समाप्त होने पर उज्जर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
10. केवल नीले / काले बाल ज्वाईंट पेन का ही इस्तेमाल करें।
11. किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है।
12. गलत उज्जर के लिए अंक नहीं काटे जायेंगे।

ELECTRONIC SCIENCE

PAPER—II

Note : This paper contains **fifty** (50) objective-type questions, each question carrying **two** (2) marks. Attempt **all** of them.

- An electron rising through a potential of 250 V will acquire an energy of :
 - 250 eV
 - 800 eV
 - 250 J
 - 800 J
- If the amount of impurity, either donor type or acceptor type added to the intrinsic semiconductor is controlled to 1 part in one million, the conductivity of the sample :
 - increases by a factor 10^3
 - reduces by a factor 10^{-3}
 - increases by a factor 10^6
 - reduces by a factor 10^{-6}
- The fourier transform of a function on $X(t)$ is $X(f)$. The fourier transform of $\frac{dX(f)}{df}$ will be :
 - $\frac{dx(f)}{df}$
 - $j 2\pi f x(f)$
 - $j f x(f)$
 - $\frac{x(f)}{j f}$
- Laplace transform and Fourier integrals are related through :
 - frequency domain
 - time domain
 - both frequency and time domain
 - none

5. A clamper circuit :
- (i) adds or subtracts a dc voltage to or from a waveform
 - (ii) does not change the shape of the waveform
 - (iii) amplifies the waveform
- (A) (i) and (ii) are correct
(B) (i) and (iii) are correct
(C) (ii) and (iii) are correct
(D) (i), (ii) and (iii) are correct

6. The amplifier gain with positive feedback is given by :

(A) $\frac{A}{1 + \beta A}$

(B) $\frac{A}{1 - \beta A}$

(C) $\frac{A}{1 - \beta}$

(D)

7. A ring counter consisting of five flip flop will have :

- (A) 5 states
- (B) 10 states
- (C) 32 states
- (D) infinite states

8. Which one of the following can be used as parallel to series converter ?

- (A) Decoder
- (B) Encoder
- (C) Digital counter
- (D) Multiplexer

9. An interrupt in which the external device supplies its address as well as the interrupt request, is known as :
- (A) vectored interrupt
 - (B) maskable interrupt
 - (C) polled interrupt
 - (D) non-maskable interrupt
10. In 8085 microprocessor, the value of the most significant bit of the result following the execution of any arithmetic or Boolean instruction is stored in the :
- (A) carry status flag
 - (B) auxiliary carry status flag
 - (C) sign status flag
 - (D) zero status flag
11. An instruction that can be recognized and used without translation must be written in :
- (A) Source code
 - (B) Machine code
 - (C) Basic language
 - (D) Assembly code
12. What is the name of the arrangement where by several central processing units share one memory ?
- (A) Multitasking
 - (B) Multiprogramming
 - (C) Multiprocessing
 - (D) Concurrent programming
13. The angle for which there is no reflection and the incident wave is vertically polarized is known as :
- (A) Steradian angle
 - (B) Reflection angle
 - (C) Brewster's angle
 - (D) Critical angle

14. The characteristic impedance of a transmission line is given by :

(A) $\frac{1}{\sqrt{LC}}$

(B)

(C) $\sqrt{\frac{C}{L}}$

(D) \sqrt{LC}

15. A PLL can be used to demodulate :

(A) PAM signals

(B) PCM signals

(C) PM signals

(D) DSB-SC signals

16. The main function of balanced modulator is to :

(A) produce balanced modulation of a carrier wave

(B) produce 100 percent modulation

(C) suppress carrier signal in order to create a single side band or double side band

(D) limit noise picked up a receiver

17. An SCR can be termed as :

(A) DC switch

(B) AC switch

(C) Both DC and AC switch

(D) Square wave switch

18. Fiber optics communication offers the largest bandwidth in the range of :
- (A) 10^{10} Hz
 - (B) 10^6 Hz
 - (C) 10^{14} Hz
 - (D) 10^{20} Hz
19. Silicon photosensors have their maximum spectral response in the :
- (A) infrared region
 - (B) ultraviolet region
 - (C) visible region
 - (D) X-ray region
20. Open loop transfer function is given by $G(S)H(S) = \frac{k}{S^2(T_s + 1)}$, the system is :
- (A) stable
 - (B) unstable
 - (C) marginally stable
 - (D) absolutely stable
21. Match **List-I** with **List-II** and select the correct answer using the codes given below the lists :
- | <i>List-I</i> | <i>List-II</i> |
|------------------|-----------------------------|
| (a) Zener diode | (i) High speed switching |
| (b) Tunnel diode | (ii) Multivibrator circuits |
| (c) Gunn diode | (iii) Voltage stabilizer |
| (d) PIN diode | (iv) Microwave oscillator |

Codes :

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

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

<i>List-I</i> (<i>Transducer</i>)	<i>List-II</i> (<i>Measured Quantities</i>)
(a) Venturi tube	(i) Displacement
(b) Optical tachometer	(ii) Pressure
(c) Linear Variable Differential Transformer	(iii) Flow
(d) Pirani Gauge	(iv) Velocity

Codes :

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

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

<i>List-I</i>	<i>List-II</i>
(a) Frequency Modulation	(i) Envelop detection
(b) Double sideband suppressed carrier signal	(ii) Companding
(c) PCM	(iii) Balance Modulator
(d) Amplitude Modulation	(iv) Pre-emphasis and deemphasis

Codes :

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

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

List-I

(With respect to Magnetron average o/p power, duty cycle)

- (a) 25 W
- (b) 50 W
- (c) 100 W
- (d) 150 W

List-II

(With respect to Magnetron peak o/p power in Watts)

- (i) 6250
- (ii) 5000
- (iii) 2500
- (iv) 1250

Codes :

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

25. Match the **List-I** with **List-II** :

List-I

- (a) AND
- (b) OR
- (c) NOT
- (d) NOT EQUAL

List-II

- (i) ||
- (ii) !=
- (iii) & &
- (iv) !

Codes :

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

26. Match **List-I** with **List-II** :

<i>List-I</i>	<i>List-II</i>
(a) Auxillary carry	(i) 7
(b) Sign	(ii) 6
(c) Zero	(iii) 4
(d) Parity	(iv) 2

Codes :

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

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

<i>List-I</i>	<i>List-II</i>
(a) Solar Cell	(i) Spontaneous emission
(b) LED	(ii) Stimulated emission
(c) LASER	(iii) Photovoltaic conversion
(d) Reflex Klystron	(iv) Velocity modulation

Codes :

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

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

- | <i>List-I</i> | <i>List-II</i> |
|---------------------|--|
| (a) ROM | (i) Volatile memory |
| (b) RAM | (ii) Non-volatile memory |
| (c) Magnetic Memory | (iii) Erasable Programmable Read Only Memory |
| (d) EPROM | (iv) Permanent memory |

Codes :

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

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

- | <i>List-I</i> | <i>List-II</i> |
|---------------|----------------|
| (a) Bit | (i) 16 bit |
| (b) Byte | (ii) 1 bit |
| (c) Nibble | (iii) 4 bit |
| (d) 8086 | (iv) 8 bit |

Codes :

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

30. Match List-I with List-II :

<i>List-I</i>	<i>List-II</i>
<i>With respect to copper film thickness (A°), resistivity ($\Omega\text{-cm} \times 10^{-7}$)</i>	<i>Surface resistance (Ω / Square)</i>
(a) 100, 0.52	(i) 7.25
(b) 80, 0.58	(ii) 21.50
(c) 60, 0.68	(iii) 5.20
(d) 40, 0.86	(iv) 11.33

Codes :

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

Assertion - Reason type questions :

Q. 31 to 40 : *The following items consist of two statements, one labelled the '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 answers 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 and (R) is false
- (D) (A) is false and (R) is true

31. **Assertion (A) :** Silicon is widely used in IC technology.

Reason (R) : Silicon technology is less expensive and SiO_2 layer can be easily formed on silicon.

32. **Assertion (A)** : The greater the 'Q' the smaller the bandwidth of a resonant circuit.
Reason (R) : At high frequencies the 'Q' of a coil falls due to skin effect.
33. **Assertion (A)** : In an Op-Amp circuit when one input terminal of the Op-Amp is grounded, the other terminal becomes virtual ground.
Reason (R) : Input impedance of the Op-Amp is high.
34. **Assertion (A)** : Master-Slave JK flip-flop is free from race-around condition.
Reason (R) : Master-Slave uses two JK flip-flops.
35. **Assertion (A)** : A processor can reference a memory stack without specifying an address.
Reason (R) : The address is always available and automatically updated in the stack pointer.
36. **Assertion (A)** : Subroutines are used in larger programming.
Reason (R) : Program testing at the program development time will be easier.
37. **Assertion (A)** : Two cavity Klystron is now-a-days frequently used as microwave amplifier.
Reason (R) : Velocity and current modulation occurs in Klystron.
38. **Assertion (A)** : A half-adder is faster than full adder.
Reason (R) : A half adder gives only one output while a full adder gives two outputs.
39. **Assertion (A)** : Optical fibers have broader bandwidth to conventional copper cables.
Reason (R) : The information carrying capacity of optical fiber is limited by Rayleigh's scattering loss.
40. **Assertion (A)** : Piezoelectric crystals serve as a source of ultrasonic wave.
Reason (R) : The crystals can generate wave having frequencies greater than 20 kHz.

41. Give sequence of the following interrupts on priority basis from highest to the lowest :

- (i) RST 5.5
- (ii) RST 6.5
- (iii) RST 7.5
- (iv) TRAP

Codes :

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

42. The highest data rate can be transmitted using the following cables :

- (i) Twisted-wire cable
- (ii) Co-axial cable
- (iii) Fiber-optic cable

Code :

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

43. Write down the different computer network from lowest to the highest order :

- (i) LAN
- (ii) WAN
- (iii) MAN
- (A) (ii), (i), (iii)
- (B) (iii), (i), (ii)
- (C) (i), (ii), (iii)
- (D) (i), (iii), (ii)

44. Consider the following rectifier circuits :

- (i) Half-wave rectifier without filter
- (ii) Full-wave rectifier without filter
- (iii) Full-wave rectifier with series inductance filter
- (iv) Full-wave rectifier with capacitance filter

The sequence of these rectifier circuits in decreasing order of their ripple factor is :

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

45. What is the correct sequence of the following steps for fabrication of monolithic, bipolar junction transistor ?

- (i) Emitter diffusion
- (ii) Base diffusion
- (iii) Buried layer formation
- (iv) Epilayer formation

Code :

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

Read the paragraph and answer the questions 46 to 50 :

Cathode ray oscilloscope is an electronic device which gives a visual representation of electrical quantities such as voltage and current waveforms in an electrical circuit. The name cathode ray is given because the electron beam was first thought to consists of rays from the cathode. A CRO consists of the Cathode Ray Tube (CRT), power supplies, time base circuit and deflection voltage amplifiers. The heart of cathode ray oscilloscope is CRT. Its chief advantage is that it produces the visual representation directly with extremely high speed because of the high velocity of electrons.

46. The oscilloscope can be considered as a :
- (A) low impedance instrument
 - (B) high impedance instrument
 - (C) medium impedance instrument
 - (D) infinite impedance instrument
47. Sawtooth waves are used most frequently to move the electron beam in an oscilloscope :
- (A) back and forth across the screen
 - (B) up and down on the screen
 - (C) back and down on the screen
 - (D) none of the above
48. The deflection sensitivity of a CRT depends inversely on the :
- (A) length of the vertical deflecting plates
 - (B) distance between screen and deflecting plates
 - (C) deflecting voltage
 - (D) separation between Y plates
49. Two complete signal cycles would be displaced on the screen scope when time period of the sweep generator is _____ the signal time period.
- (A) half
 - (B) twice
 - (C) equal
 - (D) thrice
50. An electrostatic cathode ray oscilloscope is a :
- (A) current indicating device
 - (B) voltage indicating device
 - (C) Both (A) and (B) above
 - (D) None of the above

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Space For Rough Work

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