

**PAPER-II**  
**ELECTRONIC SCIENCE**

**Signature and Name of Invigilator**

1. (Signature) \_\_\_\_\_  
(Name) \_\_\_\_\_
2. (Signature) \_\_\_\_\_  
(Name) \_\_\_\_\_

**J 8 8 1 3**

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

Roll No. 

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(In figures as per admission card)

Roll No. \_\_\_\_\_  
(In words)

Time : 1 ¼ hours]

[Maximum Marks : 100

Number of Pages in this Booklet : 8

Number of Questions in this Booklet : 50

**Instructions for the Candidates**

- Write your roll number in the space provided on the top of this page.
- This paper consists of fifty multiple-choice type of questions.
- 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 :
  - To have access to the Question Booklet, tear off the paper seal / polythene bag on the booklet. Do not accept a booklet without sticker-seal / without polythene bag and do not accept an 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 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.**
  - After this verification is over, the OMR Sheet Number should be entered on this Test Booklet.
- Each item 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 :** (A) (B) (C) (D)  
where (C) is the correct response.
- Your responses to the items are to be indicated in the **OMR Sheet given inside the Paper I 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 in the end of this booklet.
- If you write your Name, Roll 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 the original OMR Sheet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall. You are however, allowed to carry 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 marks for incorrect answers.

**परीक्षार्थियों के लिए निर्देश**

- पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए ।
- इस प्रश्न-पत्र में पचास बहुविकल्पीय प्रश्न हैं ।
- 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 :
  - प्रश्न-पुस्तिका खोलने के लिए पुस्तिका पर लगी कागज की सील / पोलिथीन बैग को फाड़ लें । खुली हुई या बिना स्टीकर-सील / बिना पोलिथीन बैग की पुस्तिका स्वीकार न करें ।
  - कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चैक कर लें कि ये 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 आपकी अतिरिक्त समय दिया जायेगा ।**
  - इस जाँच के बाद OMR पत्रक की क्रम संख्या इस प्रश्न-पुस्तिका पर अंकित कर दें ।
- प्रत्येक प्रश्न के लिए चार उत्तर विकल्प (A), (B), (C) तथा (D) दिये गये हैं । आपको सही उत्तर के वृत्त को पेन से भरकर काला करना है जैसा कि नीचे दिखाया गया है ।  
**उदाहरण :** (A) (B) (C) (D) जबकि (C) सही उत्तर है ।
- प्रश्नों के उत्तर केवल प्रश्न पत्र I के अन्दर दिये गये OMR पत्रक पर ही अंकित करने हैं । यदि आप OMR पत्रक पर दिये गये वृत्त के अलावा किसी अन्य स्थान पर उत्तर चिह्नांकित करते हैं, तो उसका मूल्यांकन नहीं होगा ।
- अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें ।
- कच्चा काम (Rough Work) इस पुस्तिका के अन्तिम पृष्ठ पर करें ।
- यदि आप OMR पत्रक पर नियत स्थान के अलावा अपना नाम, रोल नम्बर, फोन नम्बर या कोई भी ऐसा चिह्न जिससे आपकी पहचान हो सके, अंकित करते हैं अथवा अभद्र भाषा का प्रयोग करते हैं, या कोई अन्य अनुचित साधन का प्रयोग करते हैं, तो परीक्षा के लिये अयोग्य घोषित किये जा सकते हैं ।
- आपको परीक्षा समाप्त होने पर मूल OMR पत्रक निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद उसे अपने साथ परीक्षा भवन से बाहर न लेकर जायें । हालांकि आप परीक्षा समाप्ति पर OMR पत्रक की डुप्लीकेट प्रति अपने साथ ले जा सकते हैं ।
- केवल नीले/काले बाल प्वाइंट पेन का ही इस्तेमाल करें ।
- किसी भी प्रकार का संगणक (कैलकुलेटर) या लाग टेबल आदि का प्रयोग वर्जित है ।
- गलत उत्तरों के लिए कोई अंक काटे नहीं जाएँगे ।

**ELECTRONIC SCIENCE**  
**Paper – II**

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

1. In intrinsic semiconductor
  - (A) the electron density is twice the hole density
  - (B) the electron density is thrice the hole density
  - (C) the electron density is square root of the hole density
  - (D) the electron density is same as the hole density
2. PN junction diode can be used as a/an
  - (A) Oscillator
  - (B) Amplifier
  - (C) Insulator
  - (D) Rectifier
3. Norton's equivalent form in any complex impedance circuit consists of
  - (A) an equivalent current source in parallel with an equivalent resistance.
  - (B) an equivalent voltage source in series with an equivalent resistance.
  - (C) an equivalent current source in parallel with equivalent impedance.
  - (D) an equivalent voltage source in series with equivalent impedance.
4. Zener diode is a
  - (A) reverse biased diode
  - (B) variable voltage source
  - (C) constant current source
  - (D) forward biased diode
5. Which of the following oscillator make use of both positive and negative feedbacks ?
  - (A) Hartley oscillator
  - (B) Colpitt's oscillator
  - (C) Phase shift oscillator
  - (D) Wein-Bridge oscillator
6. Superposition theorem can be applied only to circuits having
  - (A) resistive elements
  - (B) passive elements
  - (C) no-linear elements
  - (D) linear bilateral elements
7. Identify the fastest analog to digital converter
  - (A) Ramp conversion
  - (B) Parallel conversion
  - (C) Successive approximation
  - (D) Dual-slope integration
8. 1 K memory device contain
  - (A) 1064 memory cells
  - (B) 1024 memory cells
  - (C) 512 memory cells
  - (D) 640 memory cells
9. Which logic function has the output low only when both inputs are high ?
  - (A) NOR
  - (B) OR
  - (C) AND
  - (D) NAND

10. In FM, when frequency deviation doubled, then
- (A) Modulation Index is decreased
  - (B) Modulation Index is doubled
  - (C) Modulation Index halved
  - (D) No change occurs in modulation index values
11. Out of the following memory types, one that is volatile is
- (A) magnetic disc
  - (B) ferrite core
  - (C) semiconductor ROM
  - (D) semiconductor RAM
12. An SCR can be formed by using
- (A) 2 npn transistors
  - (B) 2 pnp transistors
  - (C) 1 npn and 1 pnp transistor
  - (D) 2 pn diode
13. The pH of human blood is between
- (A) 6.5 to 7
  - (B) 7.5 to 8
  - (C) 8 to 9
  - (D) 4.5 to 5
14. What is SIM ?
- (A) Select Interrupt Mask
  - (B) Sorting Interrupt Mask
  - (C) Set Interrupt Mask
  - (D) Start Instruction Mode
15. Quantization noise occurs in
- (A) TDM
  - (B) PCM
  - (C) FDM
  - (D) WDM
16. Which antenna gets circularly polarized ?
- (A) Yagi-Uda
  - (B) Dipole
  - (C) Parabolic
  - (D) Helical
17. VSWR (Voltage Standing Wave Ratio) is always
- (A) more than 1
  - (B) less than 1
  - (C) 1
  - (D) 0.4
18. The ladder network used in D/A converter is
- (A) weighted resistance ladder
  - (B) R – R ladder
  - (C) R – 2R ladder
  - (D) R – C ladder
19. Latch is a
- (A) T flip-flop
  - (B) Master-slave JK flip-flop
  - (C) D flip-flop
  - (D) JK flip-flop
20. In LED, light is emitted, because
- (A) diode emits light when gets heated.
  - (B) recombination of charge carrier takes place.
  - (C) light is made to reflect due to lens action.
  - (D) LED amplifies the light falling on it.

**Directions (Q. Nos. 21 to 30) :** 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 carefully 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 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 correct explanation of (A).
- (C) (A) is true, but (R) is false.
- (D) (A) is false, but (R) is true.

**21. Assertion (A) :** 8421 code is weighted code.

**Reason (R) :** 8421 code is self-complementary.

**22. Assertion (A) :** A stack is a type of non-sequential access memory system.

**Reason (R) :** Memory stacks help in keeping track of return addresses and saving data for subroutines.

**23. Assertion (A) :** TEM waves exist in a waveguide.

**Reason (R) :** Phase velocity and wave impedance for TEM waves are independent of the frequency of the waves.

**24. Assertion (A) :** In FSK, a binary 1 usually produces a higher carrier frequency than a binary 0.

**Reason (R) :** FSK maintains a constant amplitude carrier.

**25. Assertion (A) :** An LTI discrete system represented by the difference equation  $y(n+2) - 5y(n+1) + 6y(n) = x(n)$  is unstable.

**Reason (R) :** A system is unstable if the roots of the characteristic equation lie outside the unit circle.

**26. Assertion (A) :** Stimulated emission is the key to the operation of LASER.

**Reason (R) :** An important property of LASER radiation is its coherence, under which is meant the correlation between the phases of oscillation at different positions in space and at various moments of time.

**27. Assertion (A) :** R-2R ladder type D/A converter has a higher speed of conversion than a weighted resistance D/A converter.

**Reason (R) :** R-2R ladder type converter uses a smaller number of components than the weighted resistance D/A converter.

**28. Assertion (A) :** UJT is used in relaxation oscillators.

**Reason (R) :** UJT has negative resistance region in its characteristics.

**29. Assertion (A) :** The race hazard problem does not occur in combinational circuits.

**Reason (R) :** The output of a combinational circuit depends upon present inputs only.

**30. Assertion (A) :** Digital communication needs some synchronisation signals.

**Reason (R) :** ‘bit syn’ signal is required in time division multiplexing to distinguish groups of data.

31. Consider the following logic families :
- |        |        |
|--------|--------|
| 1. MOS | 2. TTL |
| 3. RTL | 4. ECL |
- The correct sequence of the logic families in the order of their increasing noise margin is  
 (A) 3, 4, 1, 2      (B) 3, 4, 2, 1  
 (C) 4, 3, 2, 1      (D) 4, 3, 1, 2
32. Which is the correct sequence in the generation of PCM ?
1. Sampling
  2. Converting to PAM
  3. Quantization
  4. Adding of supervisory signal
  5. Encoding
- (A) 1, 2, 5, 3, 4      (B) 1, 5, 2, 3, 4  
 (C) 1, 2, 3, 5, 4      (D) 4, 5, 1, 2, 3
33. Consider the following logic families :
- |        |         |
|--------|---------|
| 1. MOS | 2. CMOS |
| 3. DTL | 4. TTL  |
- The correct sequence of power dissipation in increasing order is given by  
 (A) 2, 1, 3, 4      (B) 2, 1, 4, 3  
 (C) 1, 2, 3, 4      (D) 1, 2, 4, 3
34. The data can be transmitted by following means :
1. Coaxial cables
  2. MMF
  3. SMF
  4. Twisted wire cable
- The correct sequence in the increasing order of Bandwidth is  
 (A) 2, 3, 1, 4      (B) 4, 1, 2, 3  
 (C) 4, 1, 3, 2      (D) 1, 4, 2, 3
35. Consider the following devices :
1. BJT in CB mode
  2. BJT in CE mode
  3. JFET
  4. MOSFET
- The correct sequence of these devices in increasing order of their impedance is  
 (A) 2, 1, 3, 4      (B) 2, 1, 4, 3  
 (C) 1, 2, 3, 4      (D) 1, 2, 4, 3

36. Match the following (Q. Nos. 36 – 45):
- |                   |                             |
|-------------------|-----------------------------|
| <b>List – I</b>   | <b>List – II</b>            |
| a. SCR            | i. dc drive control         |
| b. Triac          | ii. Induction motor control |
| c. Chopper        | iii. Uni-directional        |
| d. Cycloconverter | iv. Bi-directional          |
- Codes :**
- |     |     |     |     |     |
|-----|-----|-----|-----|-----|
|     | a   | b   | c   | d   |
| (A) | iv  | iii | i   | ii  |
| (B) | i   | ii  | iii | iv  |
| (C) | iii | iv  | i   | ii  |
| (D) | i   | iv  | ii  | iii |
37. Match the following (Q. Nos. 36 – 45):
- |                        |   |
|------------------------|---|
| <b>List – I</b>        | <b>List – II</b>  |
| a. Faraday's Law       | i. $\nabla \cdot \bar{D} = \rho$  |
| b. Gauss's Law         | ii. $\nabla \times \bar{E} = \frac{\partial \bar{B}}{\partial t}$           |
| c. Ampere's Law        | iii. $\nabla \cdot \bar{J} = \frac{\partial \rho}{\partial t}$              |
| d. Continuity equation | iv. $\nabla \times \bar{H} = \bar{J} + \frac{\partial \bar{D}}{\partial t}$ |
- Codes :**
- |     |     |    |     |     |
|-----|-----|----|-----|-----|
|     | a   | b  | c   | d   |
| (A) | ii  | i  | iv  | iii |
| (B) | i   | ii | iii | iv  |
| (C) | iii | iv | i   | ii  |
| (D) | iv  | i  | ii  | iii |
38. Match the following (Q. Nos. 36 – 45):
- |                   |                                 |
|-------------------|---------------------------------|
| <b>List – I</b>   | <b>List – II</b>                |
| a. Varistor       | i. Nonlinear resistance         |
| b. Varactor diode | ii. Nonlinear reactance         |
| c. Gunn diode     | iii. Negative resistance        |
| d. PIN diode      | iv. Controllable impedance type |
- Codes :**
- |     |     |     |     |     |
|-----|-----|-----|-----|-----|
|     | a   | b   | c   | d   |
| (A) | i   | ii  | iii | iv  |
| (B) | ii  | iii | iv  | i   |
| (C) | iii | iv  | i   | ii  |
| (D) | iv  | i   | ii  | iii |

- 39. List – I List – II**
- |                    |                          |
|--------------------|--------------------------|
| a. Klystron        | i. Cross-field device    |
| b. Reflex Klystron | ii. Bunching             |
| c. Magnetron       | iii. Velocity modulation |
| d. Gunn diode      | iv. Negative resistance  |

**Codes :**

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

- 40. List – I List – II**
- |                |                          |
|----------------|--------------------------|
| a. LED         | i. Stimulated emission   |
| b. LASER       | ii. Spontaneous emission |
| c. Solar Cell  | iii. Power generator     |
| d. Photo diode | iv. Detector             |

**Codes :**

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

- 41. List – I List – II**
- |        |                                |
|--------|--------------------------------|
| a. DAA | i. Program control instruction |
| b. LXI | ii. Data movement instruction  |
| c. RST | iii. Interrupt instruction     |
| d. JMP | iv. Arithmetic instruction     |

**Codes :**

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

- 42. List – I List – II**
- |          |                      |
|----------|----------------------|
| a. 8031  | i. Multiplexer       |
| b. 7490  | ii. Demultiplexer    |
| c. 74155 | iii. Microcontroller |
| d. 74151 | iv. Decade counter   |

**Codes :**

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

- 43. List – I List – II**
- |                 |                 |
|-----------------|-----------------|
| a. Bourdon tube | i. Distance     |
| b. Strain gauge | ii. Temperature |
| c. Thermistor   | iii. Pressure   |
| d. LVDT         | iv. Stress      |

**Codes :**

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

- 44. List – I List – II**
- |  |   |
|--|---|
| <b>(Types of ADC)</b>                    | <b>(Characteristics)</b>  |
| a. Parallel-comparator (i.e. flash) type | i. Integrating type   |
| b. Successive approximation              | ii. Fastest converter   |
| c. Dual slope                            | iii. Conversion time is independent of the amplitude of the analog signal |
| d. Counter type                          | iv. Uses DAC in feedback path   |

**Codes :**

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

- 45. List – I**
- a. Flip-Flop can be used as latch  
 b. Flip-Flop can be used as delayed  
 c. Flip-Flop does not have race problem  
 d. Flip-flop can be used as shift registers
- List – II**
- i. D Flip-flop  
 ii. Master-Slave  
 iii. JK  
 iv. R-S

**Codes :**

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

Read the paragraph and answer the questions **46 to 50** :

Microwave tubes are used as microwave amplifiers and oscillators. Three general type of microwaves tubes in which third type of tubes are useful. In this tube there is an interaction between an electron and an RF field is continuous. The Travelling Wave Tube (TWT) is the prime example of this interaction. It is an amplifier whose oscillator counter part is called Backward Wave Oscillator (BWO). Another group of tube in which a magnetic field ensures a constant electron beam – RF field interaction and this is complimented by the cross-field amplifier (CFA). Multicavity Klystron is used as an amplifier of microwaves and it consists of buncher cavity and cache cavity. The Reflex Klystron is a low power and low efficiency microwave oscillator. Reflex Klystron oscillator has been replaced by various semiconductor oscillators.

- 46.** One of the following is unlikely to be used as pulsed device. It is the  
 (A) Multicavity Klystron  
 (B) BWO  
 (C) CFA  
 (D) TWT
- 47.** One of the reason why vacuum tubes eventually fail at microwave frequencies is that their  
 (A) noise figure increases  
 (B) transit-time becomes too short  
 (C) shunt capacitive reactance becomes too large  
 (D) series inductive reactance become too small
- 48.** The Multicavity Klystron  
 (A) has a high repeller voltage to ensure a rapid transit time.  
 (B) is not a good low-level amplifier because of noise.  
 (C) is not suitable for pulsed operation.  
 (D) needs a long transit time through the buncher cavity to ensure current modulation.
- 49.** Indicate the false statement. Klystron amplifiers may use intermediate cavities to  
 (A) increase the band width of the device  
 (B) improve the power gain  
 (C) increase the efficiency of the Klystron  
 (D) prevent the oscillations that occur in two cavity Klystron
- 50.** TWT is sometimes preferred to the multicavity Klystron amplifier because the former  
 (A) is more efficient  
 (B) has a greater band width  
 (C) has a higher number of modes  
 (D) produces a higher output power

**Space For Rough Work**