

**Signature and Name of Invigilator**

1. (Signature) \_\_\_\_\_

(Name) \_\_\_\_\_

2. (Signature) \_\_\_\_\_

(Name) \_\_\_\_\_

**J-8806****PAPER – II****Time : 1¼ hours]****ELECTRONIC SCIENCE****[Maximum Marks : 100****Number of Pages in this Booklet : 12****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 on the edge of this cover page. Do not accept a booklet without sticker-seal 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 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.
- 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)

where (C) is the correct response.
- 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.
- Read instructions given inside carefully.
- Rough Work is to be done in the end of this booklet.
- 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.
- 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.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table etc., is prohibited.
- There is NO negative marking.

**Answer Sheet No. : .....**

(To be filled by the Candidate)

**Roll No.**

--	--	--	--	--	--	--	--

(In figures as per admission card)

**Roll No.** \_\_\_\_\_

(In words)

**Test Booklet No.****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 उसके कवर पेज पर लगी कागज की सील को फाड़ लें। खुली हुई या बिना स्टीकर-सील की पुस्तिका स्वीकार न करें।
  - कवर पृष्ठ पर छपे निर्देशानुसार प्रश्न-पुस्तिका के पृष्ठ तथा प्रश्नों की संख्या को अच्छी तरह चेक 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 आपको अतिरिक्त समय दिया जायेगा।**
  - इस जाँच के बाद प्रश्न-पुस्तिका की क्रम संख्या उत्तर-पत्रक पर अंकित करें और उत्तर-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 दीर्घवृत्त 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** उत्तर-पत्रक पर ही अंकित करने हैं। यदि आप उत्तर पत्रक पर दिये गये दीर्घवृत्त के अलावा किसी अन्य स्थान पर उत्तर चिन्हंकित 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 उत्तर-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।
- आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें।
- 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 उत्तर 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.

- In a semiconductor, if the charge carriers can make a transition from the valence to the conduction band without the change in the momentum value, the material is known as :  
(A) Wide band gap material                      (B) Narrow band gap material  
(C) Direct band gap material                      (D) Indirect band gap material
- Which of the following transistors can be used in a E - mode ?  
(A) JFET                      (B) MOSFET                      (C) n-p-n transistor                      (D) UJT
- The transient current in loss free L - C circuit when excited from an ac source is :  
(A) an under damped                      (B) an undamped  
(C) an over damped                      (D) critically damped
- The Thevinis theorem results in :  
(A) a voltage source with an impedance in series  
(B) a voltage source with an impedance in parallel  
(C) a current source with an impedance in series  
(D) a current source with an impedance in parallel
- The voltage gain in the inverting OPAMP is :  
(A) ratio of feedback impedance to source  
(B) ratio of output impedance to input impedance  
(C) ratio of input impedance to output impedance  
(D) reverse ratio of current gain
- JFET has main drawback of :  
(A) having low input impedance                      (B) having high output impedance  
(C) being noisy                      (D) having small gain - bandwidth product
- The minimum number of flip - flops required in a counter to count 60 pulses is :  
(A) 4                      (B) 6                      (C) 8                      (D) 10
- In a CMOS logic family, the power consumption will be lowest under the operating condition :  
(A)  $V_{DD} = 5V, f_{max} = 1 \text{ MHz}$                       (B)  $V_{DD} = 5V, f_{max} = 10 \text{ KHz}$   
(C)  $V_{DD} = 10V, f_{max} = 10 \text{ KHz}$                       (D)  $V_{DD} = 10V, f_{max} = 1 \text{ MHz}$

9. Which of the following is an example of volatile memory ?  
 (A) ROM (B) Hard Disk (C) RAM (D) PROM
10. If instruction RST - 5 is written in a program, the program control will jump to location :  
 (A) 0020 H (B) 0024 H (C) 0028 H (D) 0002 H
11. FORTRAN subroutine always :  
 (A) follows data card (B) follows main program  
 (C) jumps main program (D) succeeds main program
12. The structured programming forbids use of :  
 (A) WHILE - DO (B) DO - WHILE  
 (C) IF - THEN - ELSE (D) GO - TO
13. The gain of an isotropic antenna is :  
 (A) 0 dB (B) 5 dB (C) 10 dB (D) 15 dB
14. According to energy band theory of a n - type Gallium Arsenide, a high mobility lower valley is separated by an energy of  $\delta E$  from a lower mobility valley in which :  
 (A)  $e_g = \delta E_g$  (B)  $e_g < \delta E_g$  (C)  $e_g > \delta E_g$  (D)  $e_g = 2\delta E_g$
15. The PPM can be converted into PDM by modifying the circuit of :  
 (A) Monostable multivibrator (B) Astable multivibrator  
 (C) Bistable multivibrator (D) All the above
16. At higher frequencies, the most important type of noise observed is :  
 (A) Shot noise (B) Transit time noise  
 (C) Flicker noise (D) Thermal noise
17. In a thyristor holding current is :  
 (A) more than latching current (B) less than latching current  
 (C) equal to latching current (D) very small
18. The following process is used to make optical wave guides :  
 (A) Ion exchange (B) Titanium diffusion  
 (C) Epitaxy (D) Photo lithography
19. A microphone is classified as a \_\_\_\_\_ transducer.  
 (A) Optical (B) Acoustical (C) Magnetic (D) Thermal
20. Nyquist stability criterion is based on principle of :  
 (A) Arguments (B) Imaginary numbers  
 (C) S - plane (D) Conjugates

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

- | <b>List - I</b> |  | <b>List - II</b>     |  |
|-----------------|--|----------------------|--|
| (a) Ionic       |  | (i) Solid Argon      |  |
| (b) Covalent    |  | (ii) Copper          |  |
| (c) Metallic    |  | (iii) Silicon        |  |
| (d) Vander wall |  | (iv) Sodium chloride |  |

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

22. Match List - I with List - II :

- | <b>List - I</b>         |  | <b>List - II</b>  |  |
|-------------------------|--|---|--|
| (a) Passive Network     |  | (i) Contain electrically separable passive circuit elements     |  |
| (b) Active Network      |  | (ii) Contains electrically inseparable passive circuit elements |  |
| (c) Lumped Network      |  | (iii) Contains circuit elements without energy sources          |  |
| (d) Distributed Network |  | (iv) Contains circuit elements with energy sources              |  |

The correct matching is :

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

23. Match List - I with List - II :

- | <b>List - I</b>                  |  | <b>List - II</b> |                                     |
|----------------------------------|--|------------------|-------------------------------------|
| (a) Intrinsic Impedance          |  | (i)              | $\frac{1}{\sqrt{\pi f \mu \sigma}}$ |
| (b) Velocity of wave propagation |  | (ii)             | $\sqrt{\omega \mu \sigma}$          |
| (c) Skin depth                   |  | (iii)            | $\sqrt{\mu / \epsilon}$             |
| (d) Attenuation constant         |  | (iv)             | $\frac{1}{\sqrt{\mu \epsilon}}$     |

The correct matching is :

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

24. Match List - I with List - II :

<b>List - I</b>	<b>List - II</b>
(a) Gunn diode	(i) Junction less device
(b) Solar cell	(ii) Single Junction device
(c) BJT	(iii) Double Junction device
(d) SCR	(iv) Triple Junction device

The correct matching is :

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

25. Match List - I with List - II :

<b>List - I</b>	<b>List - II</b>
(a) 8255	(i) Programmable DMA controller
(b) 8257	(ii) Programmable Counter/Timer
(c) 8259	(iii) Programmable peripheral Interface
(d) 8253	(iv) Programmable Interrupt controller

The correct matching is :

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

26. Match List - I with List - II :

<b>List - I</b>	<b>List - II</b>
(a) Float	(i) 1 byte
(b) Char	(ii) 2 bytes
(c) Int	(iii) 10 bytes
(d) Long double	(iv) 4 bytes

The correct matching is :

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

27. Match List - I with List - II :

<b>List - I</b>	<b>List - II</b>
(a) F.M. Broadcast	(i) 100 tetra hertz
(b) A.M. Broadcast	(ii) 10 GHz
(c) Microwave Communication	(iii) 200 KHz
(d) Optical Communication	(iv) 600 MHz

The correct matching is :

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

28. Match List - I with List - II :

<b>List - I</b>	<b>List - II</b>
(a) Ideal OPAMP	(i) Increased bandwidth
(b) Push pull amplifier	(ii) Infinite input impedance
(c) Negative feedback amplifier	(iii) Increased gain
(d) Positive feedback amplifier	(iv) Power amplification

The correct matching is :

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

29. Match List - I with List - II :

<b>List - I</b>	<b>List - II</b>
(a) DC - DC	(i) Inverters
(b) DC - AC	(ii) Cycloconverters
(c) AC - DC	(iii) Choppers
(d) AC - AC	(iv) Rectifiers

The correct matching is :

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

30. Match List - I with List - II :

List - I	List - II
(a) Strain gauge	(i) Voltage generating type
(b) Eddy current gauge	(ii) Variable inductance type
(c) Dielectric gauge	(iii) Variable resistance type
(d) Piezo electric pick - up	(iv) Variable capacitance type

The correct matching is :

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

(Questions 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 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

31. **Assertion (A) :** Tunnel diode can be used as a microwave oscillator.

**Reason (R) :** The diode is made up of degenerate semiconductor.

32. **Assertion (A) :** In a constant voltage source, the internal impedance of the voltage source is very low as compared to the load impedance.

**Reason (R) :** The lesser the ratio of  $Z_i/Z_L$ , the better is the source as a constant voltage source.

33. **Assertion (A) :** NPN transistors are generally used in amplifiers in CE mode.

**Reason (R) :** The gain of an amplifier in CE mode is greater than common base mode.

34. **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.
35. **Assertion (A) :** High level languages are third generation languages (3 GLs).  
**Reason (R) :** The program written in high level languages is problem oriented rather than computer oriented.
36. **Assertion (A) :** Mode 2 operation of 8255 is strobed bidirectional operation.  
**Reason (R) :** When Port A is programmed in mode 2, the Port B can be used in either mode 1 or mode 0.
37. **Assertion (A) :** Gunn diode is generally used to generate power at microwave frequencies.  
**Reason (R) :** Gunn diode is made up of degenerate semiconductors.
38. **Assertion (A) :** Radio and Television receivers are generally of the super heterodyne type.  
**Reason (R) :** Wireless communication is possible by receiving signals through super heterodyne receivers.
39. **Assertion (A) :** Thyristors are preferred to power diodes in variable power rectifiers.  
**Reason (R) :** Thyristors provide controlled rectification and also the power loss in them is less.
40. **Assertion (A) :** The Wien Bridge can be used for frequency measurement.  
**Reason (R) :** The Wien Bridge uses only capacitors and resistors.
41. The below mentioned are the TTL - sub families.  
 (i) 74  
 (ii) 74 S  
 (iii) 74 LS  
 The correct sequence of these sub families in the increasing order of their propagation delay in nano seconds is :  
 (A) (ii), (i), (iii)  
 (B) (i), (iii), (ii)  
 (C) (iii), (i), (ii)  
 (D) (i), (ii), (iii)

42. The various processor chips which operate at different speeds are :

- (i) 8086
- (ii) P - II
- (iii) P - III
- (iv) 8085

The correct sequence according to their speed of operation in increasing order is :

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

43. In monolithic IC's, all the components are fabricated by :

- (i) Oxidation
- (ii) Epitaxial growth
- (iii) Diffusion
- (iv) Etching

The correct sequence of fabrication is :

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

44. The following bands are used to identify the frequency range from 1 GHz to 12 GHz :

- (i) S
- (ii) C
- (iii) X
- (iv) L

The correct sequence from lower frequency band to higher frequency band is :

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

45. Some oscillators used at various places in electronic circuits are :

- (i) Hartley oscillator
- (ii) Wein Bridge oscillator
- (iii) Phase shift oscillator
- (iv) Collpitts oscillator

The correct sequence of the above oscillators with respect to the range of frequencies that they generate is :

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

*Read the passage below and answer the questions that follow based on your understanding of the passage :*

In the era of increased global warming and diminishing fossil fuel supplies, we must begin to put a greater priority on harnessing alternative energy sources. Fortunately, there are a number of readily available, resources that are both cost - effective and earth - friendly. Two such resources are solar power and geothermal power.

Solar energy, which reaches the earth through sunlight is so abundant that it could meet the needs of worldwide energy consumption 6,000 times more. And solar energy is easily harnessed through the use of photovoltaic cells that convert light into electricity. In the United States alone, more than 1,00,000 homes are equipped with solar electric systems in the form of solar panels consists solar cells generally made up of P - n junctions or solar roof tiles. And in other parts of the world, including many developing countries, the use of solar system is growing steadily.

Another alternative energy source, which is abundant in specific geographical areas, is geothermal power, which creates energy by tapping heat from below the surface of the earth. Hot water and steam that are tapped in underground pools are pumped to the surface and are used to run the generators, which produce electricity. Geothermal energy is 50,000 times more abundant than the entire known supply of fossil fuel resources. And as with solar power, the technology needed to utilise geothermal energy is fairly simple. A prime example of effective geothermal use is in Iceland, a region of high geothermal activity, where over 80% of private homes are provided with geothermal power.

Solar and geothermal energy are just two of a number of promising renewable alternatives to conventional energy sources. The time is long overdue to invest in the development and use of alternative energy on a global scale.

46. Why should we consider to use alternative energy sources :

- (A) Because fossil fuels are no longer available
- (B) Because global warming has increased the amount of sunlight that reaches the earth
- (C) Because they are free and available worldwide
- (D) Because of conventional energy sources are being depleted and they cause environmental damage

47. According to the passage, what can be inferred about solar roof tiles ?
- (A) They are used by many undeveloped countries
  - (B) They can convert geothermal power to electricity
  - (C) They are more expensive than solar panels
  - (D) They contain photovoltaic cell
48. Photovoltaic cells convert :
- (A) Electric energy to light energy
  - (B) Magnetic energy to light energy
  - (C) Light energy to chemical energy
  - (D) Light energy to electric energy
49. How is solar energy production similar to geothermal production ?
- (A) They both require the use of generators
  - (B) They both use heat from earth's surface
  - (C) They both require fairly simple technology
  - (D) They are both conventional and costly
50. Solar electric systems are basically made up of :
- (A) Silicon p - n junction diode
  - (B) Silicon
  - (C) Gallium Arsenide
  - (D) Indium phosphide heterojunctions

- o O o -

**Space For Rough Work**