

**PAPER-III**  
**ELECTRONIC SCIENCE**

**Signature and Name of Invigilator**

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

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

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

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

Roll No. 

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(In figures as per admission card)

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

(In words)

**D 8 8 1 1**

Time : 2 1/2 hours]

[Maximum Marks : 200

Number of Pages in this Booklet : 32

Number of Questions in this Booklet : 19

**Instructions for the Candidates**

1. Write your roll number in the space provided on the top of this page.
2. Answer to short answer/essay type questions are to be given in the space provided below each question or after the questions in the Test Booklet itself.

**No Additional Sheets are to be used.**

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.**
4. Read instructions given inside carefully.
5. One page is attached for Rough Work at the end of the booklet before the Evaluation Sheet.
6. If you write your Name, Roll Number, Phone Number or put any mark on any part of the Answer 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.
7. You have to return the test booklet to the invigilators at the end of the examination compulsorily and must not carry it with you outside the Examination Hall.
8. **Use only Blue/Black Ball point pen.**
9. **Use of any calculator or log table etc., is prohibited.**

**परीक्षार्थियों के लिए निर्देश**

1. पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए ।
2. लघु प्रश्न तथा निबंध प्रकार के प्रश्नों के उत्तर, प्रत्येक प्रश्न के नीचे या प्रश्नों के बाद में दिये हुए रिक्त स्थान पर ही लिखिये ।  
**इसके लिए कोई अतिरिक्त कागज का उपयोग नहीं करना है ।**
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 ।**
4. अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें ।
5. उत्तर-पुस्तिका के अन्त में कच्चा काम (Rough Work) करने के लिए मूल्यांकन शीट से पहले एक पृष्ठ दिया हुआ है ।
6. यदि आप उत्तर-पुस्तिका 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 ।
7. आपको परीक्षा समाप्त होने पर उत्तर-पुस्तिका निरीक्षक महोदय को लौटाना आवश्यक है और इसे परीक्षा समाप्ति के बाद अपने साथ परीक्षा भवन से बाहर न लेकर जायें ।
8. **केवल नीले/काले बाल प्वाइंट पेन का ही इस्तेमाल करें ।**
9. **किसी भी प्रकार का संगणक (केलकुलेटर) या लॉग टेबल आदि का प्रयोग वर्जित है ।**

**ELECTRONIC SCIENCE**  
**PAPER – III**

**Note :** This paper is of **two hundred (200)** marks containing **four (4)** sections. Candidates are required to attempt the questions contained in these sections according to the detailed instructions given therein.

**Answer to all questions must be written in English only.**

**SECTION – I**

**Note :** This section consists of **two** essay type questions of **twenty (20)** marks each, to be answered in about **five hundred (500)** words each. **(2 × 20 = 40 Marks)**

1. With the help of neat diagram, explain the operation of Hartley oscillator and explain its working. Derive the expression for frequency of oscillation and condition for starting of oscillations.

**OR**

Draw the pin diagram of 741 opamp. Explain its features and give details of three applications.







2. Classify various instructions in 8085 microprocessors. Also discuss various addressing modes with examples.

**OR**

Design a synchronous decade counter using J.K flip flops.









## SECTION – II

**Note :** This Section Contains **three (03)** questions of **Fifteen (15)** marks each to be answered in about **300 (three hundred)** words. **(3 × 15 = 45 Marks)**

3. What is need of modulation ? Compare different digital phase modulation techniques.
4. Explain SCR operation with the help of two transistor model. Derive expression for gate current.
5. What are hybrid parameters in transistors ? Obtain expressions for hybrid parameters for CE stape.



















### SECTION - III

**Note :** This section contains **nine (9)** questions of **ten (10)** marks, each to be answered in about **fifty (50)** words. **(9 × 10 = 90 Marks)**

6. Explain the operation of full wave bridge rectifier and also calculate the efficiency.

7. Explain the steps for fabrication of a BJT.

8. State and prove maximum power transfer theorem.



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10. Determine the input impedance of a 50 ohm lossless transmission line of length  $0.1 \lambda$ .  
If it is terminated in an open circuit.
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11. What do you understand by quantization process ? How quantization errors can be reduced ?

12. Draw a single phase inverter using thyristors. How does it work ?



13. Derive expression for Numerical aperture in optical fiber communication. What is its physical significance ?

14. What is pH ? How is it measured ? Explain

**SECTION – IV**

**Note :** This section contains **five (5)** questions of **five (5)** marks, each based on the following passage. Each question should be answered in about **thirty (30)** words.

**(5 × 5 = 25 Marks)**

Gunn effect is instrumental in the generation of microwave oscillators in bulk semiconductor materials. GaAs and InP have been found to possess it. If a small dc voltage is placed across a thin slice of GaAs, then negative resistance will manifest itself under certain conditions. If the voltage gradient across the slice is in excess of about 3300 V/cm. The oscillations will then occur, if the slice is connected to a suitably tuned circuit. Because of high voltage gradient across the slice of GaAs electron velocities are high, and the oscillations will occur at microwave frequencies.

It is seen that as the applied voltage rises past the negative – resistance value, current falls, and thus the classical case of negative resistance is exhibited. The oscillations observed in the GaAs slice have compatibility with the formation and transit time of electron bunches. This phenomenon leads to the formation of negative resistance domains. As a good approximation, the equivalent circuit of a GaAs, X-band Gunn diode consists of a negative resistance of about 100 ohms in parallel with a capacitance of about 0.6 pF. Gunn oscillators, Gunn amplifiers are used in broad band operation. Gunn diodes are employed frequently as low and medium power oscillators in microwave receiver instruments. Gunn diodes are also used in pump sources, because of much lower noise. Further, PIN diodes are used as detectors at microwave frequencies.

15. Differentiate between direct and indirect band gap semiconductors.

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16. Explain in detail the Gunn effect.

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17. What are Gunn domains ?

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18. List five applications of microwaves.

19. Explain the detection of microwaves using PIN diodes.

**Space For Rough Work**

<b>FOR OFFICE USE ONLY</b>	
Marks Obtained	
Question Number	Marks Obtained
1	
2	
3	
4	
5	
6	
7	
8	
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18	
19	

Total Marks Obtained (in words) .....

(in figures) .....

Signature & Name of the Coordinator .....

(Evaluation)

Date .....