

Signature and Name of Invigilator

Roll No. 

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(In figures as per admission card)

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

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

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

Test Booklet No.

**J-8806**

**PAPER – III**

**Time : 2½ hours]**

**ELECTRONIC SCIENCE**

**[Maximum Marks : 200**

**Number of Pages in this Booklet : 32**

**Number of Questions in this Booklet : 26**

**Instructions for the Candidates**

- Write your roll number in the space provided on the top of this page.
- Answers 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.**
- 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 Test 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.**
- Read instructions given inside carefully.
- One page is attached for Rough Work at the end of the booklet before the Evaluation Sheet.
- If you write your name 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, you will render yourself liable to disqualification.
- 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.
- Use only Blue/Black Ball point pen.
- Use of any calculator or log table etc. is prohibited.
- There is NO negative marking.

**परीक्षार्थियों के लिए निर्देश**

- पहले पृष्ठ के ऊपर नियत स्थान पर अपना रोल नम्बर लिखिए।
- लघु प्रश्न तथा निबंध प्रकार के प्रश्नों के उत्तर, प्रत्येक प्रश्न के नीचे या प्रश्नों के बाद में दिये हुये रिक्त स्थान पर ही लिखिये।  
**इसके लिए कोई अतिरिक्त कागज का उपयोग नहीं करना है।**
- 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 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 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 आपको अतिरिक्त समय दिया जायेगा।
- अन्दर दिये गये निर्देशों को ध्यानपूर्वक पढ़ें।
- उत्तर-पुस्तिका के अन्त में कच्चा काम (Rough Work) करने के लिए मूल्यांकन शीट से पहले एक पृष्ठ दिया हुआ है।
- 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 इसे 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 – 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.

## SECTION - I

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

**(5x5=25 marks)**

The modern era of semiconductor electronics was ushered in by the invention of the bipolar transistor in 1948 by Bardeen, Brattain and Shockley at the Bell Telephone Laboratories. This device, along with its field effect counterpart, has had an enormous impact on virtually every area of modern life. The two dominant features of p - n junctions are the injection of minority carriers with forward bias and the variation of depletion width  $W$  with reverse bias. These two p - n junction properties are used in two important types of transistors. The Bipolar Junction Transistor (BJT) uses the injection of minority carriers across a forward biased junction. The Junction Field Effect Transistor (JFET), depends on the control of a junction depletion width under reverse bias. The FET is a majority carrier device and is therefore often called a unipolar transistor. The BJT, on the other hand, operates by the injection and collection of minority carriers. Since the action of both electrons and holes is important in this device, it is called a bipolar transistor.

1. Explain the various configurations of a BJT.

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4. Discuss the operation of JFET and explain its behaviour after pinch off region.

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5. Compare BJT's with JFET's. Mention their merits and demerits.

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## SECTION - II

**Note :** This section contains fifteen (15) questions each to be answered in about thirty (30) words. Each question carries five (5) marks.

**(5x15=75 marks)**

6. What is thin film resistor ? Discuss the steps of fabrication of thin film resistor. How can the value of the resistance be changed even after fabrication ?

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7. State the maximum power transfer theorem and explain the theorem with the help of a suitable example.

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8. Discuss the principle of Schmitt trigger with necessary diagram and explain its hysteresis loop.

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9. What are the differences between synchronous and asynchronous counters.

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10. List the major components of 8259A, programmable Interrupt controller.

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13. How is bunching achieved in a cavity magnetron.

Lined area for writing the answer to question 13.

14. Why is a zero bit in a TDM signal held to a non - zero level.

Lined area for writing the answer to question 14.

15. What are  $\frac{dv}{dt}$  and  $\frac{di}{dt}$  ratings of SCR's. What happens if these ratings are exceeded ?

16. Draw the structure and refractive index profile for

- (i) Step index multimode
- (ii) Graded index



19. What is a stepper motor ? Explain its operation briefly.

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20. Distinguish between unipolar and bipolar devices.

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### SECTION - III

**Note :** This section contains five (5) questions. Each question carries twelve (12) marks and is to be answered in about two hundred (200) words. **(12x5=60 marks)**

21. Define propagation delay and fanout of digital logic system. Determine the pull up to pull down ratio of an NMOS inverter driven by an NMOS inverter.
  
22. If the speed of I/O devices do not match the speed of the microprocessors, what type of data transfer techniques are used ? Explain.
  
23. Define the characteristic impedance of a transmission line. When is the input impedance of a transmission line equal to its characteristic impedance ? Explain the meaning of the term "Standing Wave Ratio".
  
24. Write a C program in to transfer data to the parallel port of a personal computer.
  
25. Explain the function of frequency shift keying with the help of block diagram. Calculate the shot noise component of current present on a direct current of 1 mA flowing across a semi conductor junction given that the effective noise bandwidth is 1 MHz.

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FOR OFFICE USE ONLY							
Marks Obtained							
Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained	Question Number	Marks Obtained
1		26		51		76	
2		27		52		77	
3		28		53		78	
4		29		54		79	
5		30		55		80	
6		31		56		81	
7		32		57		82	
8		33		58		83	
9		34		59		84	
10		35		60		85	
11		36		61		86	
12		37		62		87	
13		38		63		88	
14		39		64		89	
15		40		65		90	
16		41		66		91	
17		42		67		92	
18		43		68		93	
19		44		69		94	
20		45		70		95	
21		46		71		96	
22		47		72		97	
23		48		73		98	
24		49		74		99	
25		50		75		100	

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

(in figures) .....

Signature & Name of the Coordinator .....

(Evaluation) Date .....